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PUBLICATIONS

INDUSTRY.

A Monthly Magazine for Manufacturers and Businessmen.

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EDITORIAL CONTENTS FOR APRIL, 1956

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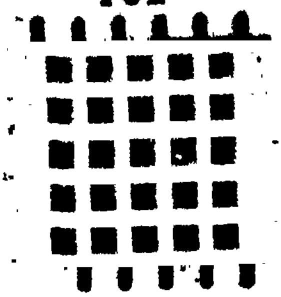
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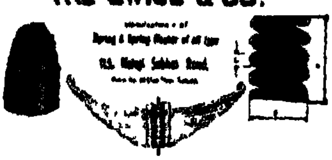
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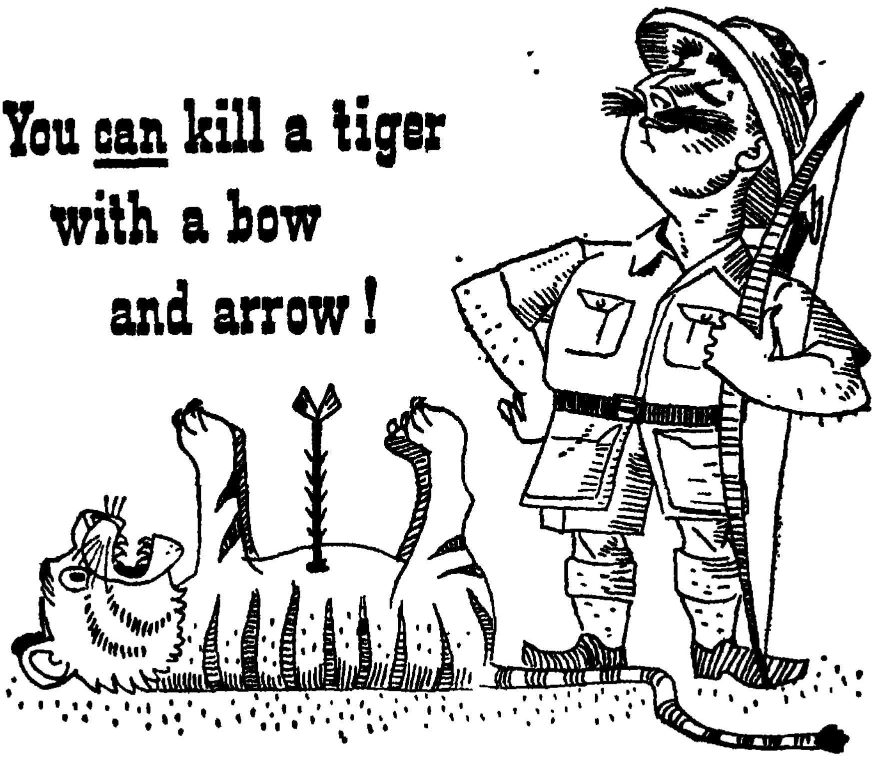
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Industry

EDITOR:

K. N. BANERJEE.

VOL. XLI. CALCUTTA, APRIL, 1950 No. 481.

POSSIBILITIES OF SMALL INDUSTRIES

IN response to numerous requests from our readers and in keeping with our forty-year old tradition of serving the needs of small business entrepreneurs we bring out in this issue a number of articles on small industries which can be started with a small capital.

But even though the capital requirements of these industries may be limited, their pursuit in the proper manner is bound to bring in inestimable benefits to those who undertake the enterprise. Apart from solving their individual problems of bread winning, small industries can go a long way towards the industrial regeneration of our country.

There is a wrong impression in certain quarters that most advocates of small and cottage industries are opposed to the present-day mechanized civilization which gives all emphasis to the heavy and large-scale industries only. The need to-day, we should think, is not the exclusive pursuit of one or the other but a harmonious co-ordinated development of both.

However desirable the development of heavy industries in the interest of our national economic reconstruction, the fact has to be faced that it has to be put off indefinitely in anticipation of help from outside which may or may not come. We should therefore lay hands on whatever resources we possess and utilize them to develop our small industries.

Small industries have ever been a part and parcel of India's national economy, and their development on scientific lines is bound to raise the volume of national production and end both unemployment and the existing low standard of living. What we would like to stress in this connexion is that the hitherto-followed antiquated processes of manufacture should be replaced by scientific ones and opportunities provided to the manufacturing personnel for picking up technical knowledge and mechanical skill both of which are necessary for the remunerative pursuit of small industries.

Small industries are not worth decrying as having outlived their utility nor is it right to think that to urge their development is to try to put the hands of the clock back. As we have said, we want them to be developed on scientific lines and that is expected to urbanise rural life itself to a perceptible extent.

THE INDIA BUDGET

The Central Budget for 1950-51 does not contain any proposal for fresh taxation. As an incentive to greater industrial production, substantial relief is given in income tax paid by companies and the business profits tax has been abolished. The Dividends Limitation Act which was responsible to a considerable extent for lack of investment has not been renewed after its expiry last month. Relief for middle class tax payers, concession for income tax payable by undivided Hindu family, abolition of distinction between earned and unearned income for super-tax, re-adjustment of Super-tax rates, etc., were announced.

The Budget proposals, however, did not provide for any reduction in existing indirect taxation. Lower rates have been announced for telegrams, trunk calls, and for letters and post cards for local delivery.

The original surplus of Rs. 9.6 crores is reduced to Rs. 1.31 crores after adjusting the changes in taxation and the lower rates for posts and telegraphs. Total revenue in 1950-51 is estimated at Rs. 339.19 crores while the expenditure will run to Rs. 337.88 crores, as compared with the revised figures for 1949-50 of Rs. 332.36 crores and Rs. 336.10 crores respectively.

Defence services are expected to cost Rs. 170.03 crores this year and Rs. 168.01 crores next year including Rs. 8 crores for the "Indian States Forces". Capital outlay on defence will cost Rs. 12 crores this year and Rs. 8.15 crores next year. Food subsidies get Rs. 29.67 crores this year and Rs. 21 crores next year. The effect of Federal Financial integration on finances of the Centre is expected to involve an expenditure of Rs. 9.5 crores. The total civil expenditure is estimated at Rs. 169.87 crores of which Rs. 6 crores are meant for refugee relief. The Capital Budget for the next year provides for an expenditure of Rs. 62 crores on capital outlay and Rs. 43 crores on loans and advances. Market borrowings are expected to bring in Rs. 75 crores.

In his review of the economic situation which is contained in a White Paper, the Finance Minister Dr. Matthai made the following points:—The inflationary trends still continue to operate and the main problem before the country is to hold them in check. Indo-Pakistani trade has reached a stage of complete deadlock and India is, therefore, making efforts to grow her own requirements of jute and cotton. Devaluation has stimulated exports and the balance of payments position has shown some improvement. Increase in industrial production has been noticed in 1949 and the set-back caused to our cotton and jute industries is due to special difficulties. The Finance Minister took the view that despite the many difficulties that still persisted the over-all picture was not gloomy and the stage of crisis had passed

The main aim of the new Budget is to provide a fillip to industrial production. Reduction in taxes for both businessmen and others is meant to promote this aim. These concessions seem justified in view of the fact that for some time past many have been attributing the lack of investment here to the Government's high taxation policy. And yet it cannot be denied that unless the beneficiaries come forward and utilize the concessions given them in the proper manner, the existing industrial stale-mate and its attendant

evils will not be removed. Now that the Government have made a good gesture, the onus of expanding investment and productive activities is shifted to a great extent on to the private investors and businessmen. The Government, perhaps, would have done better not to leave the task of industrial development completely in the hands of private enterprise. Reduction of capital expenditure does not seem to indicate that the Government have any mind to push ahead their various development projects even a partial implementation of which would have gone a long way towards ameliorating the economic lot of the common man.

WEST BENGAL'S GRIEVANCES

West Bengal is living on its reserves. But for this the Centre is to blame. As far back as 1945 this State was encouraged to start development schemes by the Centre on the understanding that the latter would provide the former with loans or grants for the purpose. But both in 1948 and 1949 the Centre made sudden mid-year cuts in its development loans to the State. This has affected West Bengal's finances very badly indeed. She could not suddenly stop the progress of her schemes and being forced to have to bridge a total gap of Rs. 17.17 crores in three and a half years ending 1950-51, the State has had to decide to utilize her reserves for financing the work of development rather than float new loans in the the present uncertain atmosphere. The State's Budget for 1950-51 reveals a deficit of Rs. 2 crores nearly. But the Finance Minister being opposed to heavy taxation did not propose to levy any new taxes or to increase the rates of the existing ones.

The Finance Minister of West Bengal expressed his disappointment at the Deshmukh Award in respect of allocation of income-tax and jute duty. Under the Otto Niemeyer Award West Bengal's share was 20 per cent. of the divisible pool, but under the Deshmukh Award her share has been reduced to a mere 13.5 per cent. In addition, the State is to receive Rs. 105 lakhs next year, as compared with Rs. 135 lakhs this year, in respect of Jute duty. In the case of income tax an additional 1½ per cent. will bring in nearly Rs. 70 lakhs. The net effect of the Award will be a gain of Rs. 40 lakhs only.

Criticizing the Award in his Budget speech the Finance Minister of West Bengal said:—(1) Sir C. D. Deshmukh's Award did not work out the allocation *de novo* in a scientific and equitable manner nor did it take into consideration the memorandum submitted by the West Bengal Government in this connexion: and (2) the Award had made every other State receive something at the expense of West Bengal, the distribution being on the basis of population.

THE RAILWAY BUDGET

The Indian Railway Budget for 1950-51 shows an estimated surplus of Rs. 14.01 crores. The current year's surplus has risen to Rs. 11.02 crores from the previously anticipated surplus of Rs. 9.44 crores. Total earnings for the next year are expected to be Rs. 232.50 crores including Rs. 17 crores from the State railways which will come under Central control with effect from April 1. Higher returns from goods traffic are anticipated and the estimated increase over the previously expected total of Rs. 210 crores may be to the extent of Rs. 15.15 crores.

There is to be no change in the current rates for passenger fares or goods freight. It is claimed that increase in operating efficiency is now noticeable. A five-year plan will be embarked upon with effect from April 1 involving an annual

expenditure of Rs. 3 crores with a view to improving . amenities for passengers. With regard to the operating record the Railways Minister said in his Budget speech that there was perceptible improvement in punctuality figures, though overcrowding was still causing a lot of anxiety. Referring to efforts to provide increased amenities to passengers, he said India was now undertaking the manufacture of locomotives and arrangement were well forward for the manufacture of all-steel welded passenger coaches.

Two of the recent achievements of the Railway Department which were referred to in the Minister's Budget speech are, the Assam Rail Link and the opening of the Locomotives works at Chittaranjan. For reasons of economy the works expenditure in the current year had to be reduced from Rs 62.35 crores to Rs. 55.60 crores and that has led to the postponement of the Burdwadih-Sarandih project and the construction of the bridge over the Ganges at Mokameh. For the next year expenditure on the works programme will be further reduced to Rs. 36.5 crores resulting in curtailment of the railways rehabilitation programme. But this will not affect the Chittaranjan Loco Works nor the Assam Rail Link for which provision has been made of about Rs. 5 crores and a half.

The Railways Minister referred to two main reforms in policy. Firstly, under the revised railway convention, a fixed dividend of 4 per cent. is to be paid to the General Revenue. The Minister described it as a "great step forward in the development of railway finance". Secondly, the regrouping of the various units of the railway system, he said, would improve the standard of efficiency, eliminate extravagance and effect economy by giving birth to one co-ordinated undertaking.

ROLLING STOCK POSITION

Discussing the rolling stock position the Railways Minister said:—

"The power position had improved very considerably in recent months, 447 broad gauge and 51 metre gauge locomotives having been received during the period between Partition and Jan. 31, 1950. Delivery of another 209 broad gauge, 156 metre gauge and 20 narrow gauge locomotives is expected to be completed in the course of the current year. Special steps have also been taken to secure the spares necessary to keep existing locomotives in efficient operation and thus avoid the adverse effects of the suspension of the normal replacement programme in the coming year.

"A technical aid agreement has been entered into with the Locomotive Manufacturing Company of Great Britain for the manufacture of locomotives at Chittaranjan. Under this agreement, the Company will make available advice, technicians and skilled supervisory staff for service at Chittaranjan and will also provide facilities for the training of the required number of Indian technicians in Britain. The target of production at Chittaranjan which has been agreed on will be three locomotive in the calendar year 1950, 33 in 1951, 45 in 1952, 66 in 1953 and 90 in 1954. At the end of five years India would be turning out locomotives entirely of Indian manufacture and the annual production will be of the order of 120 locomotives.

"The wagon position on the broad gauge is now a great deal easier but from the operation as well as the financial points of view it would be imprudent to allow the replacement programme of 3,250 wagons per year to get into heavy arrears. The wagon position on the metre gauge is unfortunately unsatisfactory. Present deficiency is of the order of 4,000 wagons.

Requirements for the metre gauge have also increased as a result of the opening of the Assam Rail Link and the intensive traffic which it has to carry. Provision however has been made for the purchase of about 1,000 metre gauge wagons in the coming year. The availability of coaching stock has however, been far from satisfactory and has to be increased.

"Mainly with the object of relieving overcrowding in passenger trains, it had been planned to obtain as many coaches as the financial position and productive capacity in the country made possible. Accordingly orders for 350 coaches were placed during the current year—100 with the Hindusthan Aircraft Ltd. and 250 with the Wagon Manufacturing Panel. While Hindustan Aircraft Ltd. have supplied 50 coaches within the current year, no supplies are likely to be received from the Wagon Manufacturing Panel until next year. Provision for 407 coaches has therefore been made in the estimates for the budget year. Of these, 50 will be from Messrs. Schlieren of Switzerland, to a design which provides wider seats, more leg room, better lighting, wash basins, mirrors and insulation against heat. 150 coaches of an interim design providing similar amenities will be obtained from Hindustan Aircraft Ltd. and 207 from the manufacture in the Railway workshops".

WORLD BANK'S FAILURE

The International Bank has failed in its primary function of financing bold schemes of post-war economic development. This is the sum and substance of the criticism levelled against the World Bank recently by Mr. A. Ramaswami Mudaliar. It is a pity that the Bank's financing activities are governed by too much caution and rigid conservatism. The World Bank acts as if it is a concern of private investors and this defies the expectation that it should have been prepared to take more risks than a private shareholders' bank could afford to.

Immediately after the war the U. S. investors showed a keen interest in expanding their investments in foreign countries and this kindled the hope that very soon the backward and underdeveloped regions of the world would get an opportunity for proper economic development. But due to uncertain political conditions as well as the phenomenon of recession already noticeable in the U. S. A., the U. S. investors' enthusiasm in regard to foreign investments is now cooling off considerably. In such circumstances Mr. Mudaliar is perfectly justified in demanding that the World Bank should sufficiently liberalize its loan policy, particularly in respect of the underdeveloped countries.

Another defect of the World Bank to which Mr. Mudaliar has drawn attention, is that its interest rates are much too high. The present rate is 4.5 per cent per annum. It does not behove the Bank to charge such a high interest as the private money lenders only could be expected to. This also runs counter to the Charter of the World Bank, which commands that loans should be given as cheaply and as quickly as possible.

The World Bank makes a very rigid distinction between "productive" and "unproductive" projects and makes loans available for "productive" projects only. The Bank has enough funds in its hands and yet its investments are limited and its resources have not been utilized for the purpose of helping backward regions on to their feet. All this is due to the Bank's close-fisted loan policy and its complete lack of a spirit of adventure and altruism. It is wrong to think that schemes which appear "non-productive" at first sight are not worth financing. If properly financed these schemes which may not be "immediately productive" can be worked and when completed they may bring greater

returns than the original investments. India's various hydro-electric schemes fall under this category.

OUR AGRICULTURAL WORKERS

There is discontent in the countryside which is bred in the extreme poverty of our backward rural folk. Efforts need to be made to eradicate the evil and there is reason to hope that Authority is waking up to the need for ameliorating the pitiable conditions of our rural workers. The Central Labour Ministry have already undertaken an inquiry into the conditions of India's agricultural workers. The inquiry is expected to cover 1,000 villages in all. Up till now work seems to have proceeded very slowly and details have been furnished for conditions of the agricultural workers in one village only in Madras.

Facts revealed by the inquiry in the Madras village are sufficiently disturbing. Most of the holdings were found to be uneconomic; 60 per cent. of these being below 2 acres, 33 per cent. between 3 and 5 acres and only 4 per cent. above 10 acres. Most of the agricultural families did have no holdings of their own but were found to be working as wage earners on the holdings of non-agricultural families. Their wages too were found to be very low,—only about Rs. 323 per year for a family of 5 members. Their diet was found to be far below the normal nutrition level. Unable to make both ends meet a majority of them, the inquiry reveals, were in the grip of debts. The annual income of Rs. 323 represented the total earnings of an agricultural family, of which Rs. 177 only constituted the earnings from field labour the rest being derived from subsidiary occupations. Medical and educational facilities were found to be equally disappointing.

MANUFACTURE OF LOZENGES

LOZENGES are much relished by children on account of their delicious taste and flavour. As these articles are coming into popular favour their demand is steadily growing. Therefore the manufacture of lozenges will form one of the profitable small industries of the present day.

RAW MATERIALS

The principal ingredient in the making of lozenges and drops is sugar, which must be crushed and double-refined. The other ingredients are liquid glucose, cream of tartar, colours and flavours, which are available ready-made in the market.

Vegetable colours were once in large use among drop and lozenge makers but these have lately been replaced by cheap edible coal-tar dyes which are not only easy to handle but also yield fine shades of colour. For red use ruby red colour; for orange use orange red, pomegranate, etc.

Flavours for lozenges may be obtained direct from the fruits and drugs. But now-a-days more often than not they are obtained from synthetic sources. Artificial fruit essences like banana essence, pineapple essence, lemon essence, orange essence, rose essence, raspberry essence, strawberry essence are available in the market.

EQUIPMENT REQUIRED

1. One Aluminium Dekchi for boiling the syrup.
2. Stone table for pouring the syrup.
3. Casting machines with suitable engraved rollers.
4. One Thermometer.

TYPICAL FORMULAS

I

Refined sugar	10	seers.
Water	10	„
Liquid glucose	2½	„

II

Refined sugar	10	seers.
Water	10	„
Liquid glucose	1½	„
Cream of tartar	½	spoonful.

III

Refined sugar	10	seers.
Water	10	„
Cream of tartar	1	spoonful.

BOILING THE SYRUP

The boiling of the syrup is to be made with the greatest caution. Several things are to be considered to get a mass of the right consistency which alone can yield drops possessing brilliant transparency.

First thing to note is to dissolve the sugar in just sufficient quantity of water. Any excess of water prolongs the boiling operation uselessly. Furthermore in such case the drops lose in transparency and are likely to get cloudy. The quantity of water that will give the best results, as observed from experience, is equal in weight to the quantity of white sugar taken. In actual practice the sugar is taken in a copper pan and covered over with an equal weight of water. The pan is now placed on the oven and the mixture is stirred with a wooden spatula until it becomes liquid. At this stage it is imperative to add some glucose or cream of tartar or both to obtain transparency in the finished drops.

Addition of correct proportions of glucose or cream of tartar is a deciding factor in the quality of the finished goods. Experience shows that liquid glucose to the extent of 25 per cent. of the weight of sugar gives good results. In this case no addition of water is necessary. When liquid glucose is added in smaller quantities, it is made good by addition of cream

of tartar in very small quantities. The glucose may be dispensed with altogether in some cases in favour of cream of tartar but in this case quality of the drops suffers materially. The proportions of sugar, water, glucose and cream of tartar are given in the recipes.

Boiling should then be continued till the mixture is of the consistency as to run without spreading too much. The usual tests for this are as follows:—

(1) On boiling it is found that bubbles rise on the surface of the mixture. At first the bubbles grow bigger and bigger in size but after some time these get diminished in size and become smaller and smaller. In fact when the bubbles almost subside the mixture is of the right consistency and is ready to be pound.

(2) Dip a wooden spatula into the boiling mass and after some time take it up and immerse in a bucket of water. When cool, take this out and examine the portion adhering to the stick. If this breaks between the fingers like a thread of glass, with a crack, the syrup is ready for making drops.

(3) Introduce a thermometer into the boiling mass. If it records a temperature of 310° to 320°F. the boiling operation should be stopped.

ADDING THE COLOUR

Appropriate colours are added to the mass in suitable quantities to produce the desired shade of colour. Only edible dyes, whether of vegetable or synthetic origin, should be used. The dyes should be made in liquid form or paste form to ensure easy incorporation in the body of the syrupy mass.

POURING THE SYRUP FOR COOLING

The melted sugar is poured into a compartment made by arranging the iron bars on the stone table previously cleaned and slightly moistened with oil. The stone should preferably be of clayey nature so that heat is conserved for a long time in the poured mass. Usually the table is 1½ to 2 inches thick. A stone thinner than this is liable to crack while a thicker one will absorb much heat from the poured mass which will then lose plasticity. The syrup is allowed to cool there. This should not, however, be allowed to be cold, for then the sugar will crystallise and cannot be made into drops. Sometimes an oven is placed underneath the table so that the mass may not get cold before handling.

ADDING THE FLAVOUR

The flavour is to be added at this stage. A few drops of the artificial fruit essences, such as those of banana, pineapple, strawberry, etc., are scattered over the mass. For flavour of orange, add a few drops of oil of neroli, or for banana a few drops of amyl acetate. The flavour is mixed intimately with the mass with the help of a big pallate knife. Special attention should be paid to attain a flavour that would appear to the taste of many, for it is almost a truism that the secret of successful sale of drops lies in the peculiarity of the flavour. In some cases a harmonious blending of more than one flavour may be found to catch the market.

CASTING BY ROLLERS

Each of the lumps are then flattened out to approximately uniform thickness, and the breadth of the sheets made out from the lump is approximately the same as that of the punching machines which essentially consist of one set of rollers and are usually designed 5 to 7 inches in length and 2¼ to 2½ inches in diameter with the design embossed on both rollers which are again interchangeable. The dies with the desired design are put into operation and the warm and soft sheets are fed into the punching machines. The handles are made to rotate with the hand and as the sheet passes between the rollers bearing

the half models of the design, it is at once converted into a batch of symmetrical drops. The upper and lower half of each drop are moulded by the corresponding hollows of the upper and lower rollers. Sheets of drops come out of the machine which are spread on the big tables and they are allowed to cool. Cold air may be blown over them. Ordinary palm leaf fans may be employed for this purpose. The sheets are then slightly tapped on the table when they break up into pieces and the drops having perfect shape will be obtained. If the pieces do not easily separate owing to the joints in the drop sheets being strong, the pieces are to be cut out by scissors. Finally the drops are sifted to remove the broken pieces and scraps, which however may be re-used.

VARIEGATED COLOUR EFFECT

The final drops can be given a blotched or streaked colouring, if desired, in the following manner. The melted sugar in the compartment, while still warm, is to be specially treated for this purpose. About one tenth of the mass is separated from the main body with the help of a knife. This is then drawn out in the form of a thick thread and again mixed up. The operation is repeated for a number of times when a quite distinct colour from the main body of the melted sugar will be seen to develop.

The mass is then rolled into a thick circular thread and cut into, say, six equal lengths. These are then arranged laterally leaving some space between each. The remaining mass of sugar is by this time flavoured and kneaded and flattened out into a size slightly bigger than the space occupied by the six sticks of sugar. The mass is put upon the six threads, and projecting portions are cut out from the sides with a knife. The whole mass is given a light pressure from the top so that the six threads previously made get attached to the main body of the plastic mass. The plastic mass is then taken up carefully and the formerly cut out projecting portions are put on the upper side. The whole is then rolled up like a scroll of paper with the side streaked with threads up. The mass is then capable of being drawn into threads again. The rest of the process is the same as in making lozenge drops as explained.

MANUFACTURE OF SOAP

SOAPS are the biggest saleable articles of all times. These are largely consumed by all classes of people for washing and laundering cloths and for toilet purposes. There are three ways of making them, namely:—

1. By cold process.
2. By semi-boiled process.
3. By full boiling process.

Of these three processes the first two can be started with a small capital. The machineries required are of moderate prices and easily available.

Let us now deal first with washing soap by these two processes and then pass on to the making of toilet soaps only by the cold process.

WASHING SOAP

The main importance of washing soap lays in its power of removing fatty impurities and abstraction of dirt from various kinds of textiles without injuring the materials. Moreover the soap will be sufficiently hard, not too hard, and does not wear away rapidly.

EQUIPMENTS REQUIRED

For the manufacture of soaps the following equipments are particularly necessary:—

1. Soap boiling pans 5 to 6 mds. capacity.
2. Silicate boiling pans 3 to 4 mds. capacity.
3. Caustic lye tanks or pans 2 mds. capacity.

4. Soap Frames.
5. Soap Cutting machines.
6. Soap Stamping machines.
7. Hydrometer (Beaume) and a glass cylinder.
8. Soap moulds.

At present coconut oil being decontrolled it is better to use some appreciable quanity of this stuff. And as you are intending to rely on vegetable oil you must have to use the following oils for making good type of soaps:—

Coconut oil. Mohua oil. Groundnut oil. Castor oil. Rosin. Cottonseed oil, etc. Caustic soda 98 p.c.; Silicate of soda 52°.; Soap yellow or metanil yellow; Perfume: lemongrass oil; citronella oil; cassia oil, etc.

WASHING SOAP BY COLD PROCESS

The common process of making soap by cold process is described under toilet soaps. Here we only deal with an improved process for the benefit of our readers.

Into a crutching pan 459.5 lbs. of coconut or palm oil are run in at the usual cold process temperature 86°—90°F., while the stirrer is moving at 18 revs. per minute.

437.5 lbs. of caustic soda solution made from 98% caustic and at a strength of 32°Be are then added and intimately mixed, the temperature of the caustic soda solution being 68°—70°F.

Rosin and oil in the proportion of 40% rosin to 60% oil or the like previously heated to 200°F and mixed together is cooled to 100°-120°F. and is treated with caustic potash solution. In this example the quantity of rosin-oil mixture is 204 lbs. and caustic potash solution 12.5 lbs. at a strength of 28°Be The whole of this mixture is then added to the crutcher contents and after brief mixing of 15 seconds the stirring device is stopped. It will be observed that at this stage the total alkali is insufficient for complete saponification of the total oil and rosin. The mass quickly solidifies after the addition of the rosin mixture but after a period of 8-10 minutes the mass becomes liquefied by the evolution of heat At this stage the stirring device is set in and 30 lbs. of weak caustic soda solution at a strength of 9°Be (temperature, 168°—170°F.) is then crutched into the mass to complete the saponification of the existing neutral oil. When the saponification is complete fillers may be crutched into the soap, if desired, after which the whole is discharged through large outlet valves into cooling frames. (Reproduced from INDIAN SOAP JOURNAL May 1948 issue).

WASHING SOAP BY SEMI-BOILED PROCESS

First of all prepare the caustic lye one or two days before the actual manufacture of soap. For this you need not weigh out the actual quantity of caustic soda solid in water. But you may take say ½md. of water in the lye tank and put into it about ½ md. of caustic soda. After putting the caustic in water stir carefully with wooden rod now and then whereby the solid may not stick to the bottom of the pan. As too much heat will evolve you have to handle with care. Next day just before the making of soap take a quantity of the cold lye in a glass cylinder or in a canister and float the hydrometer in it. Observe that the reading of hydrometer at the surface of the liquid is always more than 36° or 38° degree as the case may be in our formulas.

Dilute the lye with a little more water until the reading of the hydrometer just at the specified degree we intend to take. Now take the exact amount of caustic lye in a canister by weighing.

After making ready the caustic soda lye, weigh out the oils and put them into the soap boiling tank. Kindle the fire so as to heat up the oils.

Also weigh out the silicate of soda and put it in another pan over another oven. Put into the weighed amount of water and boil for a few minutes. Then reduce the fire so as to keep it hot.

Now when the mixture of oils in the pan is sufficiently hot giving off fumes slowly mix the caustic lye with vigorous stirring. Continue boiling and pour small quantity of water from time to time; keep the mass from forming grains. When all the grains have been broken up a paste like mass is formed, which on continued boiling begins to thicken. In soap maker's language the saponification commences. When thoroughly saponified the formed soap will not fall out of the ladle in lumps.

At this stage take out a small sample and drop it over a glass plate. If saponification is complete the drop begins to solidify outside to inside the drop without any separation of water from the side of the drop.

This stage usually happens after about 2-3 hours boiling. Now to the saponified mass mix the hot silicate of soda and stir vigorously so as to mix it up with soap.

This stirring should be continued for about half an hour by reducing the fire. After this the fire will be totally extinguished but stirring may be continued as usual. This is necessary to allow the gases to escape and also to keep the soap from burning. If you want to make the soap coloured and perfumed, take 1 oz. of soap yellow for every maund of oil taken and dissolve it with a little water and mix up with hot soap in the pan. The perfumed oil, such as cassia oil and lemongrass oil mix 1 : 1 and add to the soap now 2 oz. for every maund of soap.

After mixing all this the finished soap is run into the soap frames and keep aside for a day. Next day open the sides of the frame and when hard enough cut into bars and slabs in the usual way and then cut and stamp.

TYPICAL RECIPES

The following are some of the typical recipes of making washing soaps:—

I

Coconut oil	20	parts.
Tallow	25	"
Castor oil	3	"
Rosin	2	"
Caustic soda	8½	"
Water to make lye	20	"
Silicate of soda	15	"
Hot water to dissolve the silicate	20	"
Water to be added	40	"
Metanil yellow	1	part.

II

Coconut oil	27	parts.
Groundnut oil	25	"
Castor oil	3	"
Caustic soda	9½	"
Water to make lye	25	"
Silicate of soda	40	"
Hot water to dissolve the silicate	20	"
Water to be added	50	"

III

Coconut oil	20	lbs.
Groundnut oil	25	"
Rosin	2½	"
Castor oil	2½	"
Caustic soda lye 36°Be	27½	"
Silicate of soda	15	"
Hot water to dissolve the silicate	10	"
Water to be added during boiling	40	"
Metanil yellow	1	lb.

If perfumed washing soap is desired use 2 oz. of the following compound for every 80 lbs. of soap.

Lemongrass oil	4	oz.
Citronella oil	1	"
Cassia oil	2	"
Terpineol	2	"

TOILET SOAP BY COLD PROCESS

Before proceeding to describe the manufacturing process it may be as well to mention that the fats used must be as pure and fresh as possible also good quality caustic lyes are absolutely necessary. Further, the lye and fat must be accurately weighed out, as an excess of lye in the soap makes it very hard, harsh and biting: if too little lye is used, on the other hand, the fat would not be completely saponified and the soap would be greasy and soon acquire a rancid odour.

When melting up the coconut oil the larger part of the oil is heated to 50C: the source of heat is then removed or the fat transferred to the stirring kettle, when the remainder of the fat is added, so that finally the temperature stands at 37° to 38°C. Higher temperatures in melting should be avoided or else the oil may become discoloured.

The very simple process of making soaps in the cold way is carried out as follows:—

The requisite quantity of oil is weighed out, and after passing through a fine linen cloth or hair sieve to remove any impurities, it is run into stirring kettle. It is brought to a temperature of 27° to 33°C and then the accurately weighed quantity of the lye of 38° to 40°Be is run into it in a thin stream with constant stirring. Frequently half the quantity of lye is first added to the oil at the proper temperature, in a thin stream, with constant stirring: then if combination takes place and the mass becomes white the rest of the lye is added. The whole is then well stirred up until combination takes place, which is indicated by the mass becoming thick, and appearing perfectly uniform and translucent, also a sample taken out by the laddle should run off rather pasty and draw out into threads. If fresh Cochin coconut oil has been used for the soap this point will probably be reached after several hours' stirring, but when using Ceylon coconut oil and additions of tallow, lard, etc., considerably earlier. When the soap exhibits these characteristics the perfume is uniformly stirred in and the mass poured into the frame, which is tin-lined or covered with fine linen cloth, and especially well covered by wooden lid or with cloths, so that it gets hot. After some hours the temperature rises to about 80°C. owing to saponification, a thorough combination of oil and lye taking place. The process is assisted by the frames being well covered up. It may also here be pointed out that, in order to prevent the soap from cracking superficially when heating commences, it should be covered over with a damp cloth directly after framing. The filled frames, which must not be too high and must not be filled too full, should be placed in a room having a temperature of from 15° to 20°C.

PERFUMING

In perfuming toilet soaps the selection of essential oils are absolutely necessary to obtain good results. In case of white soaps, cassia oil and oil of cloves are of no use, as they impart a yellowish tint to them. Oil of vetivert and patchouli oil are noted for their permanent odours, and also fix the odour of other oils mixed with them. On this account these oils are very often used in small quantities for various toilet soap perfumes. Ambergris, civet, and musk also possess this property, especially the last, which enters into the compositions of most perfumes, imparting to them very considerable durability.

Regarding ehe quantity of perfume to be used, it may be stated that 4 to 8 grams are required for every kilo of soap, according to the intensity of the perfume.

CUTTING AND STAMPING

After the soap has remained in the frame about a day it is taken out, and after standing some 8 days longer it is

cut up. In cutting care must be taken to cut as little to waste as possible. The soap cut into bars, the height and breadth of the bars corresponding to the ultimate size of the cake, is laid up to dry for a short time; then the edges are trimmed off and it is cut into suitable pieces, from which the edges are likewise removed. The resulting pieces of soap are placed on trays without touching each other, dried for some time, and then finally stamped.

RECIPES

I

Coconut oil	50	kilos.
Caustic soda lye 38°Be	25	kilos.
Uranine yellow	14	grains.
Boiling water to dissolve the dye	600	grams.
Cassia oil	150	"
Oil of caraway	100	"
Lavender oil	105	"

II

Coconut oil	50	kilos.
Caustic soda lye 38°Be	25	"
Caustic potash lye 16°Be	2	"
Ginger grass oil	110	grams.
Caraway oil	80	"
Lavender oil	80	"
Thyme oil	80	"

III

Tallow	38	lbs.
Coconut oil	38	"
Caustic soda lye 38°Be	37½	"

Melt tallow and coconut oil over slow fire and strain through a piece of fine cloth. Then run in the lye, add the colour oz. if so desired, dissolved in a little boiling water. Now add the filling (if any), and lastly add the perfume. Put in frames, have two days, then cut and stamp. Dry (1 to 2 days) in open air and pack.

Perfume Mixture

Lavender	6	oz.
Linalol	3	"
Clove oil	1	"
Cassia	1	"

CHEAP TOILET SOAP

Cut into small pieces 3 lbs. of the ordinary yellow soap, put into a vessel and add 1½ pints of water and 1 oz. of pearl ash. Rise it to boiling point, then remove at once and add a few drops of essence of almonds or any other essential oil, and pour into moulds.

An article on Manfacture of Soap by full boiling process will appear in an early issue.

MANUFACTURE OF DISINFECTANTS

IN tropical countries particularly in thickly congested cities disinfectants are employed to successfully counteract, check and kill the disease-carrying germs. These have therefore come into wide use among all sections of the people, and, with the advance of hygienic science and dissemination of knowledge about sanitation far and wide, their popularity is bound to go up. Already a number of disinfectants are manufactured in the country but their production is hardly able to meet the growing demand. So there is sufficient scope in this line.

Disinfectants are of two types liquid and solid. Although the fluid disinfectants, commonly known as phenyle, are largely consumed, yet the use of solid in the form of paste or block is gradually growing its popularity among certain sections of the people.

RAW MATERIALS

The principal raw materials for making phenyle are as follows:—

1. Rosin, pale, brown, black, etc.
2. Vegetable oils such as castor oil, linseed oil, groundnut oil, etc.
3. Caustic soda.
4. Light Creosote oil.
5. Carbolic acid.
6. Tallow or Stearic acid.
7. Naphthalene.

8. Chlorinated creosote oil, Phenol, and Creosote oil.

EQUIPMENT REQUIRED

The following machineries are required for the purpose:—

1. Iron pan, big size.
2. Galvanised buckets.
3. One 1 gallon measuring can.
   One ½ gallon measuring can.
   One ¼ gallon measuring can.
4. Several big drums for storing.
5. One gallon tins.
6. Scales and Weights.

TYPICAL FORMULAS

CHEAP QUALITY

Rosin	22½	seers.
Caustic soda 98%	3¾	,,
Water to dissolve caustic soda	6	gallons.
Light creosote oil	6	,,
Soft water	24	,,

GOOD MEDIUM QUALITY

Rosin	28	seers.
Caustic soda 98%	28	,,
Water to dissolve caustic soda	10	gallons.
Light creosote oil	12	,,
Water (soft)	20	,,

BEST TYPE

I

Rosin	22	seers.
Castor oil or groundnut oil	8	,,
Caustic soda	4	,,
Water to dissolve caustic soda	8	gallons.
Light creosote oil	16	,,
Cresylic acid	2	ounces
Water (soft)	8	gallons.

II

Rosin	5	seers.
Castor oil or ground-		
Water to dissolve the caustic	1½	gallon.
Caustic soda 98%	¾	seer.
nut oil	2	,,
Caustic Potash 98 %	¼	,,
Light creosote oil	2	gallons
Carbolic acid	½	oz.
Water (soft)	6½	gallons.

HOSPITAL QUALITY

Rosin	5	seers.
Groundnut oil	2	,,
Caustic soda 98%	¾	seer.
Caustic potash	¼	,,
Water to dissolve caustic soda	2	gallons.
Light creosote oil	4	,,
Carbolic acid	½	oz.
Water (soft)	½ to 1	gallon.

N.B.—1 seer = 2 lbs.
1 gallon = 160 fl. oz.

Melt the rosin over slow fire and then mix with it the groundnut oil. As soon as profuse smoke begins to evolve slowly by degrees stir in the caustic soda solution, which has been kept ready beforehand. After adding the whole continue boiling so that complete saponification of rosin and groundnut oil may take place. A small amount of water should be added to make up the loss due to evaporation. When complete saponification takes place a deep brown jelly-like mass is produced.

Now *put out the fire, add one or two* gallons of water to obtain soap solution. Then mix the light creosote oil and the carbolic acid, if specified in the formula. Lastly add the remaining water to produce the finish phenyle. Stir the whole with a bamboo or wooden rod for 10 to 15 minutes to produce good emulsion of oil and water. Keep in a big drum for a day and then put in tins.

N.B.—The water to be used should be soft. River water, well water, etc. contains too much mineral matter. This should be boiled with a little soda ash before use. For every 10 gallons of water mix ½ lb. of soda ash and boil. Then cool and use.

SPECIAL TYPE

Rosin	10	lbs.
Sulphonated castor oil	4	"
Caustic soda	1	lb.
Caustic potash	1½	"
Chlorinated cresol	1½	gallons.
Chlorinated phenol	½	lb.
Soft water	5	gallons.

First of all dissolve the caustic soda and caustic potash in 2 gallons of water. Keep aside to cool. Next melt the rosin over slow fire and mix the sulphonated oil. Reduce the fire and slowly but cautiously pour the alkali solution. Stir and heat gently until the soap is formed. Put down the fire and allow the mass to cool almost to room temperature. Then mix chlorinated cresol and chlorinated phenol one by one. Stir and then mix the remaining 3 gallons of water. Keep in a well closed drum for a couple of days. Then fill in bottles.

SOLID DISINFECTANTS

To prepare solid disinfectants the manipulation is somewhat modified. The use of tallow or stearic acid is indispensable as an additional ingredients. A few typical recipes follows:—

I

Tallow or Stearic Acid	5	lbs.
Rosin	3	"
Sulphonated castor oil	½	lb.
Light creosote oil	1	gallon.
Naphthalene	½	lb.
Caustic soda	1½	lbs.
Water to dissolve caustic soda	2	"

Place the iron pan over fire and put into it the rosin and tallow or stearic acid. When melted mix the sulphonated castor oil and then add the light creosote oil. In the meantime dissolve the caustic in the water in a separate vessel.

Now slowly pour the caustic lye into the melted rosin mixture. Stir vigorously during this time or until a thick paste is obtained. At this stage incorporate the naphthalene powder and take down the pan. Pour the mass in suitable containers and close the lid at once otherwise the naphthalene will vaporise out.

To increase the carbolic co-efficient use chlorinated creosote or cresol in place of light creosote oil.

II

Tallow	1½	lbs.
Rosin	1½	"
Light creosote oil	9	"
Naphthalene powder	1	lb.
Caustic soda	1	"
Water	2½	lbs.

Melt the tallow and rosin and while hot add the caustic soda dissolved in the water. Or, melt the fat, reduce the temperature, add the creosote oil and stir in the caustic soda.

III

Tallow	8	lbs.
Rosin	8	"
Creosote oil	5	"
Caustic soda lye (66°Tw)	9	"

Melt the tallow and rosin together, then stir in the caustic soda lye. When the transparent jelly-like mass is formed, remove the pan from the fire and stir in the creosote oil. Then put the mass into a rectangular tank to cool. When cold cut it into small cubes.

TOILET PREPARATIONS

TOILET products are the most saleable articles of commerce in all parts of the country particularly in important towns. The preparations of these articles, however, are easy and can be carried out both on a small or bigger scale. The main points of success of these preparations depend on their good perfumes and artistic make up.

In this small article it is proposed to discuss some of the easily marketable articles, as hair oils, snow, hair cream, etc.

HAIR OILS

To prepare a good type of hair oil sesamum (gingelly) oil is mainly used. This oil before being actually used as a basis should be refined, if not refined oil is purchased.

PROCESS OF REFINING THE OIL

In refining sesamum oil activated charcoal is mainly employed. For this purpose 100 lbs. of sesamum oil is taken in a steel galvanised drum. This is then heated to about 80 to 85°C over slow fire. Then mix up ½ lb. of activated charcoal. Stir vigourously for 15 minutes then remove the drum from the fire and keep aside to cool. In course of 3 or 4 days the charcoal will settle at the bottom of tht drum carrying with it all the imprities as well as the colouring matter. The clear oil is next filtered through a filter bag for three to four times so as to remove the impurities. Finally the oil is filtered through paper.

If you find this process troublesome then simply filter the oil through a filter bag twice. This will remove the gummy matters and dusts present in the oil. This will, of course produce a clear oil with yellowish tint.

Now proceed with the actual preparation of hair oil.

Take 40 lbs. of this strained oil in a drum fitted with a lid. Add to it 100 grains oil soluble red dye or orange dye as the case may be and 100 grains of Benzoic Acid. Stir the oil with a wooden rod and keep aside for a day. After this mix 8 ounces of the compound scent prepared below. Stir for a few minutes and keep aside with lid closely fitted. Keep this for four days and then stir once. Wait for a few minutes and then bottle. The oil so obtained will be highly scented.

COMPOUND SCENT

The compound scent referred above may be prepared thus:—

Sandal oil	2	ounces.
Lavender oil	1½	„
Niroli oil	4	„
Bergamot oil	1½	„
Rosemary oil	½	„
Cinnamon oil	½	„
Lemon oil	½	„
Benzyl benzoate	½	„
Otto musk	½	„
Coumarin	60	grains.

First of all dissolve the coumarin in the benzyl benzoate and then mix with it the musk and keep ready.

Next mix the essential oils ad lastly the coumarin solution. Shake for 15 minutes and keep aside for at least one week before use.

OTHER HAIR OIL PERFUMES

The following essential oils when compounded together will produce good perfumes.

Jasmin	10	dr.
Bergamot	7	„
Clove	15	mins.
Lemon	8	„
Rosemary	5	„
Neroli	20	„
Thyme	1	„

II

Bergamot	1	oz.
Lavender	1	dr.
Cassia	15	mins.
Verbena	10	„
Neroli	5	„

III

Otto rose	½	dr.
Rose geranium	2	„
Bergamot	2	„
Lemon	2	„
Cassia	10	mins.

MACASSAR OIL

Castor oil	·16	oz.
Rectified spirit	3	„
Nutmeg oil	30	drops.
Rosemary oil	10	„
Sweet marjorum	10	„
Neroli oil	10	„
Otto rose	20	„
Essence of musk	1	dr.
Oil soluble red	sufficient.	

Mix and keep aside for a few days. Shake occasionally. Finally bottle.

MEDICATED HAIR OIL

Sesame oil	10	seers.
Bhringaraj juice	2½	„
Iron powder	¼	„
Powdered triphala (three myrobalans)	½	seer.
Shyamalata (Ichnocarpus freetescens)	½	„
Sandalwood dust	¼	„
Cinnamon	⅛	„

Heat all together over water bath or slow fire in an iron drum for 8 hours or more till the water in the juice is evaporated. Then cool and strain through a cloth.

After this add the following compound scent:—

Bergamot oil	1	oz.
Lavender oil	½	„
Lemon oil	½	„
Clove oil	¼	„
Cassia oil	½	„

SNOW

Snow is one of the important toilet articles next to perfumed hair oils. It is a type of vanishing cream possessing pearly appearance which disappears when rubbed over the skin.

I

Stearic acid, triple pressed	40	tolas.
Borax	1	tola.
Caustic potash	3	tolas.
Glycerine	½	fl. oz.
Distilled water	60	„ „
Rectified spirit	1½	„ „
Compound scent	1½	„ „

To begin with the process, weigh out the caustic potash and put it in a small enamel vessel. Pour into it one-third of the distilled water. Stir frequently until the caustic is dissolved in the water. Then dissolve in it the borax.

Next weigh out the stearic acid and put them in a bigger enamelled vessel.

Now put the brass vessel over the oven and pour into it a few pounds of common water or drinking water. Over the mouth of this vessel place the enamelled vessel containing the stearic acid. Apply heat to melt the solids.

In the meantime measure out the glycerine and pour into the caustic potash solution. After this heat this mixture to near the boiling point.

Heat also the remaining water to about 80°C or near its boiling temperature.

Now take down the enamelled vessel with molten stearic acid and pour in the hot caustic solution over the melted stearic acid with vigourous stirring, so that the emulsification may take place thoroughly. After mixing the whole of the caustic the mass becomes too thick. Go on stirring for a few minutes and observe the mass gradually softens. This generally takes place after 10 minutes stirring. Then gradually mix the hot water. After this go on stirring vigourously until the mass is solidified and cooled down to room temperature. When cold mix the rectified spirit and then the compound scent. Stir for sometime then cover the mouth of the enamelled vessel with tray and keep aside.

Next day again stir for a few minutes and cover with the tray and keep

aside. Next 4 or 5 days repeat this operation. The object is to enhance the pearliness with the breaking up of the crystals. After this put in phials, and keep aside.

COMPOUND SCENT FOR SNOW

Rose oil	1 oz.
Rose geranium oil	½ ,,
Sandal oil	¼ ,,
Rhodinol	2 dr.
Vetivert oil	2 ,,

II

Stearic acid triple pressed	1 lb.
Sodium carbonate	½ oz.
Potassium hydroxide	½ ,,
Glycerine	6 ,,
Water	4 lbs.
Alcohol	4½ oz.
Rose oil	3 dr.
Sandal oil	1 dr.

Stearic acid is melted on water bath or in a steam-jacketted kettle. No straining is necessary if triple pressed stearic acid is used. Warm to 80°C. Now make a solution in another vessel with sodium carbonate, potassium hydroxide, glycerine in about a third of the water. Heat to 80°C for some time with stirring so that carbon dioxide may escape. Now stir in the alkali solution into the mass of liquefied fat. Continue agitation until the mass emulsifies Now add the remainder of the water at the same temperature, i.e. at 80°C and go on stirring till the temperature comes down to 40°C. Now add the perfume previously dissolved in alcohol and again stir. Allow the batch to stand for a day before filling.

HAIR CREAM

Sweet almond oil (or refined groundnut oil)	40 fl. oz.
Lime water	30 fl. oz.
Potash carbonate	80 grains.
Oil of lemon	3 drams.
Oil of bergamot	1 dram.
Lavender oil	½ oz.
Salicylic acid	60 grains.

In working out the above formula you should make the lime water first one day before because fresh limewater is absolutely necessary to ensure better result.

PREPARATION OF LIMEWATER

In making good lime water take 1 pound of quicklime and put it in a new earthen pot sufficient to hold 2 gallons of water. After putting the quicklime into the vessel pour at once 1 gallon (10 lbs.) of water. Cover the mouth of the vessel with one earthen plate. The lime will go into shaking with great evolution of heat.

As the lime is partially soluble in water only a fraction of it will go into solution while the remaining portion settles at the bottom of the vessel. Keep the vessel aside for at least 24 hours undisturbed and the strain out the clear lime water for use without disturbing the settled lime.

PROCESS

First of all warm the almond oil to about 60°C and put into the emulsifying machine. Then measure out half the lime water and slowly mix up with the oil. Stir vigorously for about 15 minutes after the addition. Next dissolve the potash carbonate in the remaining lime water. This is then poured into the partially emulsified mass. Stir for some time and then mix the essential oils and lastly the salicylic acid.

Wait for a day and then stir again and put in phials.

BORO-GLYCERINE CREAM

Boric acid	1 dr.
Glycerine	5 ,,
Dissolve by heat and mix with	
Lanoline	6 dr.
Vaseline	1 oz.

Add any perfume desired. The borated glycerine should be cooled before mixing with the lanoline.

TALCUM FACE POWDER

Powdered talc	22	lbs.
Mag. carb.	2½	„

Mix. Then perfume with the following compound scent. The amount should be judged by the manufacturer.

Carnation pink blossom	2	oz.
Ext. of trefle	2	dr.

To 12 dr. of this mixture add:—

Neroli	1	dr.
Vanillin	½	„
Alcohol	3	oz.

N.B.—Sufficient for 25 lbs.

COLD CREAM

Cold creams are essentially prepared in the form of an emulsion of waxy substances in combination with water. These are largely consumed during the dry winter mouths. A good formula is as follows:—

Almond oil	10	fl. oz.
White wax	2½	oz.
Borax	3	dr.
Water	5	fl. oz.
Rosewater	½	dr.

Melt the wax on water bath and to the melted mass add the oil and warm the mixture to 80°C. Now dissolve borax in hot water and heat to 80°C. When the above two are at 80°C, take down the wax-oil mixture from water bath, slowly stir in the borax solution and continue stirring till the mass cools to 45-40°C. Then mix rose water and pour into containers.

BRILLIANTINE POMADE

Petrolatum	20	lbs.
Ceresine wax	2	„
White beeswax	1½	oz.
Mineral oil	4	pints.
Oil of lemon	½	oz.
Oil of geranium	1	„
Oil of bergamot	1	„

Melt the first three ingredients over water bath and then mix the mineral oil. Then remove from the source of heat but continue stirring until it begins to solidify. At this stage mix the essential oils and stir again. Then put into pots.

NAIL POLISH

Celluloid in small pieces	50	parts.
Absolute alcohol	100	„
Amyl acetate	300	„
Acetone	600	„
Spirit soluble rhodamine B	0.1	„

Clean the film by boiling with soda ash solution and wash. Then cut into small pieces. Mix the alcohol, acetate and acetone in an enamelled vessel and filter bright. To this add the celluloid pieces and shake frequently until dissolved. Warm a little to get a perfect solution. Now add the colour. The product is of syrupy consistency. Pack airtight.

HANDKERCHIEF ESSENCE

Extract of jasmine	5	ounces.
Extract of violet	20	„
Extract of musk	7	„
Extract of vanilla	1½	„
Rose oil	1½	„
Sandal oil	1½	drachms.
Orange blossom oil	40	minims.
Benzoic acid	2	drachms.
Alcohol	3 to 4	pints.

Mix.

TARAL ALTA

Rhodamine B extra	2	oz.
Brilliant crociene	1	„
Rectified spirit	4	„
Glycerine	1	lb.
Glue	2	oz.
Water	40	„

Soak the glue in a portion of the water for a couple of hours: then warm and mix the remaining water. Raise the temperature to boiling point and add the colours and glycerine. Then set aside to

cool. When cold add the spirit and bottle.

MANUFACTURE OF INKS

SINCE human progress reached the stage of written communication of ideas there has been a constant endeavour to simplify writing materials, just as the tendency to simplify the forms of ideographic symbols has developed into the important of writing.

Extensive investigations have been conducted to determine the best combinations, which will insure permanence of records, ease of application, and minimum corrosion to the implements of application.

Government specifications have been set with too much emphasis upon chemical composition and insufficient attention to physical properties in that some of the starting materials are products of nature which vary in the content of essential ingredients.

The list of inks below may contain some omissions but it is an example of many available to-day and the confusion of adhering strictly to descriptive titles alone.

Printing, ceramic, copying, fingerprint, glass, hectograph, indelible, transfer, stamping, writing, stencil, sympathetic India, luminous, engraving, lithographic, drawing etc.

ESSENTIAL OF GOOD INKS

While manufacturing ink particular attention should be paid to the following points:—

(1) The ink must flow readily from the pen without spreading too freely on the paper and must quickly show a strong and decided hue of the colour which the ink is intended to produce.

(2) The ink should penetrate into the fibres, but should not come through the paper.

(3) The ink must not corrode metallic pens.

(4) The ink must be non-poisonous and must not deposit any sediment and become mouldy.

ORDINARY WRITING FLUIDS

In nearly every case these inks contain tannate of iron. Tannin being a very abundant substance in the vegetable kingdom, it follows that a very large number of plants can be utilized for making inks. It must be borne in mind, however, that although the various tannic acids of different plants are closely allied, they show wellmarked differences in properties.

The following may serve as a list of the chief vegetable materials used for making tannic inks: gall-nuts, myrobalans, dividivi, catechu, etc.

Tannin inks comprise both black and blue-black inks. The most of the celebrated inks in the market belong to this class.

MANIPULATIONS

Whenever gallnuts are used to prepare inks, the first thing to be done is to bruise them thoroughly. When logwood or catechu is used, it should be cut into chips or small pieces. If myrobalans are to be used, they should be crushed and unseeded. They are steeped in vats specially provided for the purpose. Iron vats and cauldrons may be used for the occasion. They are covered over with water and allowed to digest for several days for the extraction of the tannin. Sometimes the whole is brought to a boil to expedite the reaction. As presence of woody fibres of the galls is injurious in ink manufacture, sometimes they are placed in a bag which is then hung in water with two-thirds or whole of its bulk immersed. Sometimes boiling of the galls is also recommended with several

lots of water for complete extraction. When gallic acid inks are to be prepared, the galls are left alone to ferment in a moist condition. Moulds form on the surface and sometimes it is a good plan to inoculate the mass with the mould from a piece of a mouldy bread or leather. The conversion into gallic acid is completed in 8 to 10 days. To prevent further action boiling water is poured over the mass to kill the ferment. The solution of gallic acid can then be drawn off by a cock.

The ferrous sulphate should be powdered before addition and if possible dissolved in a separate lot of water. See that the sulphate is not oxidised or even partially oxidised, which will mar the ink. The gum arabic may be similarly dissolved in another lot of water before addition to ink but this is unnecessary when it is mixed into boiling liquor.

BLUE-BLACK WRITING INK WITH GALLS

Blue Aleppo galls	4½	oz.
Bruised cloves	1	dr.
Cold water	40	oz.
Ferrous sulphate	1½	,,
Sulphuric acid	35	mins.
Indigo-paste (neutral)	1	oz.

Place the galls, when bruised, with the cloves in a 50 oz. bottle, pour upon them the water, and digest with daily stirring, for a fortnight. Then filter through paper into another bottle. Get out, also the refuse of the galls and wring out of it the remaining liquor through a strong, clean linen or cotton cloth into the filter, in order that as little as possible be lost. Next put in the ferrous sulphate, dissolve completely and filter through paper; then add the acid and agitate briskly; lastly, the indigo, and thoroughly mix by shaking. Pass the whole through paper. Filter out of one bottle into the other till the operation has been completed. On a large scale this fine ink be made by percolation. No gum or sugar is required, except when intended for copying; then 5½ oz. of galls should be used and 3 dr. of sugar.

BLUE-BLACK WRITING INK OF SUPERIOR QUALITY

Tannic acid	10	tolas.
Gallic acid	4	,,
Ferrous sulphate	15	,,
Sulphuric acid (strong)	1	oz.
Gum arabic	5	tolas.
Carbolic acid	2	oz.
Ink blue	56	tolas.
Distilled water	4	gallons.

Proceed in the same manner as directed under Fountain pen ink later on.

RED WRITING INK

Ruby red	5	tolas.
Ink red	3	,,
Gum arabic	1	tola.
Hot water	200	fl. oz.
Boric acid	1	tola.

Mix.

BLUE-BLACK FOUNTAIN PEN INK

I

Tannic acid	4½	tolas.
Gallic acid	8½	,,
Ferrous sulphate	12	,,
Sulphuric acid (strong)	1	oz.
Gum arabic	3	tolas.
Carbolic acid	1½	oz.
Ink blue	6	tolas.
Distilled water or rain water	3½	gallons.
Rectified spirit	2	oz.

Take one big earthen or enamelled vessel. Place the vessel over the oven and put into it 300 ounces of distilled water. When it is about to boil put in the tannic and gallic acids. Go on heating to boiling point.

In the meantime take another enamelled vessel and pour into it the remaining 180 ounces of the water. Dissolve in it the gum arabic and ferrous sulphate. Then add into it the sulphuric acid.

When the tannic acid and gallic acid solution begins to boil slowly mix up the ferrous sulphate solution with stirring. After adding the whole continue heating. In this way boil the whole mixture for 5 minutes. Then mix up the carbolic acid and the ink blue After boiling for another few minutes take down the vessel from the oven and allow it to cool.

When cold strain the ink through a cloth and pour into a stoneware glazed jars. Then add the rectified spirit and set aside for a month. After this filter through a cloth once more and then through a filter paper and bottle.

II

Tannic acid	1.55	oz.
Gallic acid	.50	„
Ferrous sulphate	2	„
Hydrochloric acid (dilute)	1.67	„
Carbolic acid	.20	„
Ink blue	.50	„
Distilled water	160	„

Dissolve the tannic acid and gallic acid in about 3 pints of hot water and add to it the dilute hydrochloric acid (of about 7°Be) and then the solution of ferrous sulphate, and carbolic acid in about 2 parts of water. Bring up to 160 oz., mix well and let stand for 3 weeks Then decant without stirring up any sediment formed. Lastly filter through filter paper and book.

FOUNTAIN PEN RED INK

This is usually made by dissolving an aniline dye in water, occasionally with the addition of a small amount of sugar or gum acacia. It is advisable first to mix the dye with a portion of the cold water, set aside for a few hours and then add the remainder of the water heated to boiling to effect complete solution.

I

Eosin A	½	oz.
Sugar	1	„
Distilled water	30	„
Rectified spirit	½	„

II

Carmine	½	dr.
Solution of ammonia	½	oz.
Mucilage of acacia	2	dr.
Rectified spirit	2	„
Water to produce	4	oz.

Dissolve the carmine in the solution of ammonia, and add the mucilage, and water.

III

Cochineal, in powder	3	oz.
Ammonium carbonate	75	gr.
Water	30	oz.

Macerate for 24 hours, filter, and add to the filtrate

Alum (fee from iron)	75	gr.

GREEN FOUNTAIN PEN INK

Emerald green	1	oz.
Naphthol green	1	„
Gum arabic	½	„
Hot water	100	fl. oz.
Boric acid	50	grs.
Spirit	1	oz.

Dissolve the ingredients in hot water and keep aside to cool. Then add the rectified spirit and bottle.

HEKTOGRAPH INK

VIOLET

Methyl violet	10	parts.
White acetic acid	5	„
Alcohol 90 p. c.	10	„
Water	10	„
Glycerin	5	„

Heat the water to boiling point and mix the methyl violet and glycerin. Remove from fire and when the temperature comes down to about 50°C mix the acetic

acid and the alcohol. Lastly filter through flannel.

BLACK

Nigrosine	15	parts.
Alcohol	40	,,
Glycerin	100	,,
Acetic acid (glacial)	5	,,
Hot water	500	,,

Mix and dissolve.

For green use brilliant green in place of nigrosine; for red use fuchine and for yellow use auramine instead of nigrosine.

INK FOR GLASS AND PORCELAIN

Shellac	4	parts.
Borax	1	part.
Aniline dye	1	,,
Water	150	parts

Warm the water and stir in borax and shellac. Cool and filter. Then add the dye.

RECORD INK

Tannic acid	23.4	parts.
Gallic acid	7.7	,,
Ferrous sulphate	30.0	,,
Hydrochloric acid	25.0	,,
Phenol	1.0	,,
Gum	3.5	,,
Water	909.4	,,

This is also made by simple mixing, except that the gum should be softened overnight with a portion of the water in a separate vessel and then heated over warm water the next day until a smooth clear solution is obtained. It can then be added to the other mixture.

INK FOR NUMBERING MACHINES

Lampblack	1	oz.
Acacia gum	164	gr.
Glycerine	2	dr.
Water	80 mins. to 100	mins

Dissolve the acacia in the water, add the glycerine and strain. Then triturate the lamp black with the strained liquid until uniform product is obtained.

LITHOGRAPHIC INK

Yellow wax	10	oz.
Shellac	8	,,
Mastic	5	,,
Tallow	4	,,
Yellow soap	4	,,
Venice Turpentine	½	,,

Melt together, and add gradually and with constant stirring:

Lampblack	2½ oz.

INK FOR STAMPING RUBBER BALLOONS

Nigrosine	3	grm.
Water	15	,,
Glycerine	70	,,
Alcohol		q. s.
Lamp black		q. s.

Dissolve the nigrosine in the water; add a few grm. of alcohol, and then the glycerin. To this mixture add, with constant trituration, enough lampblack to make a thick cream. Dilute this to the desired fluidity with alcohol.

STAMPING INK

This type, which is used in office is applied either with a rubber or metal implement and is affected by the humidity of the atmosphere due to the carelessness of having the pad exposed when not in use. However, recently the simple glycerol, water, dye mixture has been improved upon and this trouble has been lessened.

Glycerol	39	parts.
Water	39	,,
Butyl carbitol	19	,,
Nigrosine (water soluble)	3	,,

The dye is dissolved in the water and when solution is complete the other two components are added. In case other colours are desired methyl violet can be substituted for nigrosine in the amount of 1.6 or fuchsine 1.6.

STENCIL INK

Shellac solution (5 lb. per gal.).	25	parts.

Beeswax	2	parts.
Turpentine	6	„
Alcohol	61	„
Pigment	6	„

The beeswax and turpentine are heated together on a water bath until a solution is complete and upon cooling to a gelatinous mass the pigment is stirred in and wet with alcohol until a smooth mixture is obtained. The shellac and the balance of the alcohol is then added and mixing continued until the desired marking properties are obtained.

LAUNDRY MARKING INK

Aniline oil	85	parts.
Potassium chlorate	5	„
Distilled water	44	„
Hydrochloric acid, pure (specific gravity, 1.124)	68	„
Copper chloride, pure	6	„

Mix the aniline oil, potassium chlorate, and 26 parts of the water and heat in a capacious vessel, on the water bath, at a temperature of from 175° to 195°F., until the chlorate is entirely dissolved, then add one-half of the hydrochloric acid and continue the heat until the mixture begins to take on a darker colour. Dissolve the copper chloride in the residue of the water, add the remaining hydrochloric acid to the solution, and add the whole to the liquid on the water bath, and heat the mixture until it acquires a fine red-violet colour. Pour into a flask with a well-fitting groundglass stopper, close tightly and set aside for several days, or until it ceases to throw down a precipitate. When this is the case, pour off the clear liquid into smaller (one drachm or a drachm and a half) containers.

WATERPROOF DRAWING INK

Bleached shellac, fresh	20	grms.
Borax	7	„
Water	1000	c. c.

Dissolve the above by warming and stirring; then add with stirring.

Erythrosine yellow	1	oz.

By substituting the following dyes in a like amount the corresponding shades are obtained·

Orange	Brilliant Orange R.
Yellow	Chloramine yellow.
Green	Bril. Green B.
Blue	Wool blue G. Extra.
Violet	Methyl Violet B.
	Benzamin Brown 3 Go.

STAMP PAD INK

Glycerin	5	lbs.	6	oz.
Water	4	„	2	„
Methyl Violet			6¾	oz.

Warm the glycerin and water to 150°F and add methyl violet stirring slowly. Allow to cool and stand for a few days and filter.

INK POWDERS

Ink powders are mainly used by school children in writing their books. These may be very cheap and at the same time their shades should be attractive. Another feature of this ink is that the writing may not soak and spread over the paper. A few formulas of these type of inks are as follows:—

Blue-Black (Best)

Methyl blue	8	oz.
Methyl violet	2	„
Boric acid	½	„
Dextrin white or yellow	2	„

Mix in a mortar thoroughly and pack in small paper packets each weighing 10 grains. This is sufficient to produce 2 oz. of good ink.

Blue-Black (Ordinary)

Methylene blue	8	oz.
Methyl violet	1½	„
Sugar, powdered	2	„

Gum. arabic powder or dextrin ½ oz.
Borik acid ¼ „

Mix and make packets as before but in this a packet may be produced with 15 grains of the powder instead of 10 grains.

Red

Ink red or eosine A	8	oz.
Sugar, powdered	8	„
Dextrin	4	„
Borik acid	½	„

Mix.

INK TABLETS

In making tablets you may take any of the above compositions in a mortar and moisten it with as little water as possible. Do not add too much water which will take a long time to dry. Now put this moist lump over a tray and expose it to dry in the sun for three to four hours or more. When dry break the lump into coarse powder so as to form granules like mustard. Now compress into tablets in a tablet-making machine.

MIRROR MAKING

MIRROR making is one of the industries which may be taken up on a cottage industry scale. A simple and easy method is necessary. Considering these points the following methods have been described in detail.

In making mirrors the proper type of glass sheet should be selected first. The glass must not have any wave. The sheet is next cut into proper size and is cleaned thoroughly as described below:—

PROCESS OF CLEANING THE GLASS

The cleaning of the glass before silvering should be carefully done. It is washed with a strong solution of washing soda (soda ash) and water 1 part soda dissolved in 4 parts water. This will remove the oily matter from glass surface. Then it is washed with dilute solution of sulphuric acid (1 part sulphuric acid mixed in 9 parts water). Both these processes are done by rubbing the glass with a piece of cloth. The glass piece is then washed thoroughly with ordinary drinking water and finally with distilled water. *After washing, the surface of the glass* should not be touched by hand. It should be held with clean dry piece of cloth or with a string. This is then placed flat in a rectangular enamelled tray or dish of suitable size. The upper side will form the mirror and the deposit from the bottom side will be rubbed off in the manner directed below.

The old method of silvering glass is briefly described here:—

A sheet of tin-foil, a little larger than the glass to be silvered is spread out in a silvering table, made smooth by a brush being passed over it, then coated with mercury by means of a brush. When the surface is uniformly coated, mercury is added so as to make a depth of 3/16 inch to ¼ inch of the foil. The coating of oxide that appears is removed by a wooden tool, having a brilliant surface. The piece of glass is pushed slowly forward from the side with the long edge forward, and just dipping below the surface of the mercury to exclude the air. This ensures contact between the glass and metal, producing a brilliant surface. The plate is now practically floating on a bed of mercury. The next thing to do is to carefully load the glass with weights, and then tilt the table a little, say 10° to 12°, and so cause excess of mercury to flow away. Day by day the mirror is tilted a little more until it is upright. In the course of 3 or 4 weeks the glass has a dry, permanent coating of tin amalgam. The method has objections besides the time taken, the vapour of mercury is *poisonous, the loading of the glass, unless*

carefully done, occasionally results in a fracture. The coating, too, is liable to crystallisation and is rather easily damaged.

The following is a successful method for the inexperienced, and produces a fixed hard film of good density. Get three open glass jars or tumblers and chemically cleanse them with nitric acid. Dissolve 180 gr. of nitrate of silver in 3 oz. of distilled water in one of the jars. When dissolved take ½ oz. of this solution, and put it aside in another jar or bottle, this also being chemically clean.

In another of the tumblers dissolve 150 gr. of caustic potash in 2½ oz. of distilled water.

In the third jar dissolve 75 gr. of chemically pure glucose in 2½ oz. of distilled water.

Now take the first tumbler with the silver solution in it and drop some pure ammonia solution into it until the solution becomes a muddy brown colour. Continue dropping the ammonia until the solution becomes clear again and looks as it was before the ammonia was added. Now take another ½ oz. of silver solution and drop some of this in the ammoniated solution drop by drop in the same manner as the ammonia was added. This will make the solution muddy again, more yellow than brown. Use care with the silver solution, as any spilled in the hands will remove the skin. Now add the potash solution, and the mixture will go blackish. After this continue dropping ammonia in, stirring with a glass rod all the time, until the solution begins to clear again. It will not get as clear as before as there will be numberless black particles. Filter the solution by pouring it through a funnel in which is a plug of cotton wool or a filter paper. Now add more of the spare silver solution, drop by drop, stirring all the time, until a very faint precipitate again occurs, then immediately stop dropping the solution. Prepare the silvering dish, set it level and pour the solution in. Add sufficient distilled water to make it the right height in the dish. Pour the glucose solution in, and stir together. Immerse the surface of the glass gently, holding it slanting as it is lowered in so that air-bubbles will not be held under. By the time the glass is in position the solution will be a pale reddish purple colour, and will grow darker. A fine deposit of silver will soon come, and will be complete in from 10 to 20 minutes. Well wash the mirror with water, and place on edge to dry. The film can be polished with fine wash-leather over a pad of cotton-wool for about 15 minutes. The polishing must be gently done.

Another practical method of silvering glass is as follows:—

A

Silver nitrate	1	ounce.
Distilled water	10	ounces.

B

Caustic soda	1	ounce.
Distilled water	10	ounces.

C

Glucose (syrupy)	5	ounces.
Distilled water	10	ounces.

D

Ammonia Solution: This is prepared by dissolving Ammonia fort in equal quantity of water (1 part ammonia in 1 part water).

Now take 9 ounces of solution (A) in a glass pot and add to it the diluted solution of ammonia drop by drop till turbidity first produced is cleared. Stir always with a glass rod during the addition of ammonia. Now to this clear solution pour the solution (B) and again add the solution of ammonia to make the solution. Then a little solution (A), which was kept aside for the purpose, is added

drop by drop till the solution is decidedly turbid again.

Now filter the solution through filter paper and dilute the filtrate with an equal volume of distilled water. This solution is called the silvering solution and mark this as (E).

Next take enamelled tray with the well-cleaned glass sheet. Pour the solution (C) on the centre of the glass and then add the solution (E) and shake the whole for a few seconds to mix well. The volume of (C) and (E) should be equal. The mixed solution should be sufficient to cover the glass plate completely. During this time a strong daylight should be avoided and the temperature of the solution (called bath) should be between 55° and 60°F. The temperature should be maintained as near 60°F as possible, and the time of immersion should be 20 to 30 seconds. The glass plate is then taken out; wash off the loose particles thoroughly with water and allow to dry in air. During washing care should be taken to avoid any pressure of the stream of water at any particular place. When the whole plate is dry, apply a paint on the top side of the deposit and keep it aside to dry itself in air. The deposit on the lower side of the glass is then cleaned off by rubbing with a piece of cotton moistened with very dilute nitric acid and then washed thoroughly under running water and dried. The mirror is now ready for framing.

RED PAINT

The red paint generally applied on the back of the mirror is a mixture of red lead and spirit varnish or red lead and good boiled oil of suitable consistency.

OFFICE PASTE

THIS is one of the indispensable article of office stationery. It is mainly prepared with starch and dextrin and sometimes with gum acacia besides other chemicals and antiseptic agents to protect it from decomposition. As the methods of preparing these pastes are varied, it is needless to give a general process so as to increase the volume of this article. The methods to be followed on are described under each recipe so that the manufacturers may not find any difficulty in understanding the different ways of manipulation.

STARCH PASTE

I

Zinc chloride	3.3 per cent.
Sodium chloride	3.5 ,, ,,
Starch	9 ,, ,,
Water	84 ,, ,,

II

Starch	3.5 per cent.
Dextrine	1.5 ,, ,,
Sodium chloride	4.5 ,, ,,
Zinc chloride	2.0 ,, ,,
Water	88.5 ,, ,,

Mix starch and dextrine into uniform paste with some of the cold water. Heat rest of water to boiling, add salt and zinc chloride, and gradually add starch mixture. Lastly add 2 p. c. salicylic acid.

A.	Wheat starch	5 lbs.
	Warm water	2 gals.
B.	Caustic soda	½ lb.
	Water	1 gal.
C.	Hydrochloric acid	8 fl. oz.
	Cold water	1 gal.

In an enamelled vessel mix C and stand aside. Mix B in another vessel stir to dissolve. Then mix A and gradually run in B. Leave half an hour, and add C with thorough stirring, diluting water to suit. Lastly add a little preservative.

STICKIEST OFFICE PASTE

I

Water	7	pints
Pale glue	2	oz.
Wheat flour	9	„
Starch	1	„
Formalin	3	fl. dr.

Mix flour and starch with half the water, leave glue dissolving in other half. Stir well and pour into glue solution. Last stir in formalin and 2 fl. drams clove oil.

II

Starch paste	1	lb.
Gelatine	2	oz.
Water	8	„
Silicate of soda	3	drachms.
Oil of cloves	q. s.	

Soak the gelatine in the water until soft, then dissolve it into a glue-pot, and while boiling hot stir it into the starch paste, which has been made in the usual way. Then boil up the mixture until thickened, allow to cool, and add the silicate of soda and clove oil.

FLOUR PASTE

(a)	Wheat flour	2	lbs.
	Cold water	32	fl. oz.
(b)	Alum	1	oz.
	Hot water	4	fl. oz.
(c)	Boiling water	96	„ „

Work the wheat flour into a batter free from lumps with the cold water. Dissolve the alum as designated in (b). Now stir (a) into (c), and, if necessary, continue boiling until the paste is thickened into a semi-transparent mucilage after which stir in the solution (b). The above makes a very firm paste.

ELASTIC PASTE

(a)	Starch	4	oz.
	White dextrine	2	„
	Cold water	10	fl. oz.
(b)	Borax	1	oz.
	Glycerine	3	fl. oz.
	Boiling water	64	„ „

Beat to a paste the ingredients given under (a). Dissolve borax in the boiling water, then pour the (a) mixture into a solution of borax. Stir until it becomes transparent. The paste will not crack, and, being very pliable, is used for paper and even leather cloth where flexibility is required.

LIQUID OFFICE GUM

I

Gum arabic	20	lbs.
Water	5	gals.
Glycerine	7	lbs.
Perfume	4	oz.
Formalin	2	„

Simmer the gum in the water until dissolved, add the glycerine towards the end, stirring in well. Then cool, and stir formalin.

II

Gum arabic	70	lbs.
Water	12	gals.
Lime water	3	„
Clove oil	½	lb.
Opoponax perfume	½	dr.

Dissolve the gum in the mixed water, stand for a week or so to settle, strain off the clear gum, and mix with the scent.

MANUFACTURE OF SNUFF

It is a common practice now-a-days both among the young and the old to inhale a pinch of snuff now and then as a brain stimulant or for the purpose of sneezing.

INGREDIENTS

The principal ingredients required in the preparation of snuff are:—

1. Tobacco leaves of best quality.

2. Slaked lime, ammonium carbonate, potassium and sodium chlorides, used for the purpose of reducing the pungent odour of tobacco leaves.

3. Deodorising agents, such as Istambul kahi, rose and keora water, etc.

4. Perfuming agents.
5. Ghee, or butter.

The finer kind of snuffs are made from the soft portions of the best desoriptions of tobacco leaves, separated from the damaged portion, and the stalks and ribs are invariably taken out. Guntur, Coimbatore and Kanara leaves are largely used for making Madras snuff which is most prized in India but Hingli tobacco of sound variety has also been found to be equally good. Tobacco leaves of the conical variety are the most used in the Punjab while the Motihari is the most utilised in Bihar. But the ordinary snuffs found in the market are mostly prepared from the coarser and damaged portion of tobacco, the midribs, stems, stalky parts, the dust or powder sifted from the bales and the fragments that are unfit for other purposes.

Certain ingredients only are allowed in snuff manufacture. Lime added must not exceed 1 per cent. The total lime and magnesia must not exceed 13 per cent. The total alkaline salts and in which the carbonates, chlorides, and sulphates of potassium and sodium and the carbonate of ammonium are included must not exceed 26 per cent.

In addition, certain oils are allowed for scenting purposes. These essential oils consist of such spices, etc., as cinnamon and cassia, cloves, otto of roses, lavender, bergamot, oil of bitter almonds and other scented barks and extracts dissolved in spirits. These essential oils are added to snuffs according to variety and flavour, and their proportion is usually a trade secret known only to the manufacturers. Tonquin beans are also allowed for scenting purposes in snuff.

DRY AND MOIST SNUFF

Snuffs of to-day are of two kinds, i.e dry or moist. Moist are made from leaves, stalks and smalls, while dry snuffs are manufactured principally from stalks of tobacco.

In the manufacture of moist snuffs the stalks, leaves, etc. are to be cured by placing them in a heap in a square wooden bin. Water is added, together with a salt solution, and the whole mass is left to ferment for several weeks. A long thermometer with a wooden handle is thrust into the centre of the mass, and the rising temperature is continuously noted as fermentation progress. It is curious to smell the pungent odour of a snuff cure as it is called, the strong ammoniacal smell prevailing as the cure proceeds, brings tears to the eyes. The mass is turned occasionally to prevent its becoming charred, and the temperature, usually starting about 90°F. must not be allowed to rise above 130°F. The "cure" is removed at the end of three to six weeks, according to the rate of fermentation and subsequently submitted to the next process. In making dry snuff the mass is sometimes turned and the leaves toasted in a stove or furnace. It is next scented or unscented; but in the latter case it should be highly dried.

MODE OF PREPARATION

Suitable tobacco is first selected and if not in a sufficiently mature state, it is rendered so by further fermentation in the manner already described. This fermentation may also be performed by sprinkling salt solution or even simple water over the leaves and allowing the mass to stand for a few days. The leaves may be moistened in a mixture of molasses and water and then allowed to ferment as well.

BAKING

The fermented tobacco leaves are next baked on a moderate fire. This is the most important operation in preparing snuff because it is upon the excellence of

the baking operation that the quality of the finished product greatly depends. Baking should be carried on to the right point. If it is conducted too much, the leaves will get charred and become useless. If the baking is imperfectly done, the snuff will look brownish. As the baking operation is continuing, the leaves should be examined by pounding from time to time. When a chocolate coloured dust is obtained, the correct degree is arrived at and the baking should be stopped at once. Usually baking operation is complete in three-quarters of an hour.

PULVERISATION

After baking the leaves are to be pulverised without delay. On a large scale the pulverisation of the leaves is carried out in a mill and on a small scale by grinding previously chopped leaves in mortars. During the operation the tobacco is frequently sifted that it may not be reduced to too fine a powder and is from time to time slightly moistened with water.

TREATMENT WITH LIME

The pulverised leaves, as a rule, are treated with slaked lime so as to render the tobacco quite agreeable by reducing its pungent odour to some extent. The usual proportion is 1½ oz. to 2 lbs. of the tobacco powder.

DEODORISATION

In preparing snuff highest importance attaches to the deodorisation of the tobacco dust. In the case of zarda or surti manufacture such deodorisation is not imperative. It is upon the degree to which the deodorisation is carried on that the quality of snuff depends. Madras snuff which is the most prized snuff in India has for its basis a quite deodorised tobacco dust, which is the best condition to receive pleasant odours.

Various methods of deodorisin tobacco have been attempted but nothin seems to be as effective as treatment wit istambul kahi, or preparations of rose an keora. Istambul kahi is the residue lef after the distillation of rose water or ott and is incorporated into tobacco dust b maceration.

TREATMENT WITH GHEE OR BUTTER

In making moist snuff like the Madra variety treatment with cow ghee or butte becomes necessary. For this purpose th toasted, pounded and limed tobacco dus is placed in a big stone mortar having capacity of 1½ seers of tobacco dust. Th bottom of the vessel is not smooth bu ridged so as to offer a grip when th tobacco dust is to be macerated. Abou 1 seer to 1¼ seers of dust is taken in on charge. In the meanwhile ghee or butte is melted and added to the dust. Th dust is then macerated with the ghee wit the help of a stone pestle. The quantit of ghee to be incorporated is a variabl factor. In making raw snuff, about 4 tolahs of ghee will be necessary for ever 24 tolahs of the dust. But for the scente snuff, the proportion of ghee is furthe increased. Usually double the quantit of ghee is employed.

FLAVOURING

Various scents have been tried wit snuff but the greatest difficulty with the is that the scents are masked by the pung ent odour of tobacco. In scenting thes it might be the first lookout of the manu facturers that the snuff is completel deodorised. To render this Istamb Kahi (dregs in the rose water industry is first added, the usual proportion bein 1 dram to every 20 tolas of dust.

The scents usually added with th snuff are coumarin, lavender oil, berg mot oil, nutmeg oil, cinnamon leaf o cascarilla oil, vanilla essence, menth

These are not added singly to the . Rather it is the custom to make a pound blend by mixing a number and f the scents in suitable proportions. scent is allowed to mature before poration. A typical recipe for snuff as follows:—

Coumarin	100	parts.
avender oil	100	„
ergamot oil	400	„
eranium oil	100	„
lutmeg oil	100	„
innamon leaf oil	50	„
ascarilla oil	50	„
'anilla essence	100	„

ut in India the flavours which seem the most employed are musk and ri (patchouli). Great care should be to find out a blend which will al to the public. Quite distinct ars can be obtained by mixing the named scents in different propor- It must be noted that patchouli must be added in over-dose because this make the snuff most offensive. One of patchouli to one chattack of the is a fair proportion and increases ness. The flavouring proportions be varied according to the degree ich the toasting operation has been icted.

ther perfumes added are the essence aquin bean, ambergris, musk and oils rgamot, cloves, lavender, otto of rose iquid extracts of flowers.

'he following scents while in com- on will suffice for 2 lbs. of snuff: ergamot 2 oz., Oil Neroli 1½ dr. and ose ½ dr.

he admixture of scents depends the individual taste of the con- s of snuff. The scents are added ding to flavour in demand and their rtion is usually trade secret n only to the manufacturer.

The different flavouring agents and deli- cate scents have given rise to many fanci- ful names for snuffs, which the flavour excepted are more often than not, quite identical.

Before concluding it is not out of place to give a brief description of the Madras and the Punjab processes:

In the manufacture of snuff in Madras the first operation consists of the separa- tion of stalks and mid-ribs from the leaves. The leafy portion is then crumb- led into small pieces, fried and powdered. The powdered tobacco is then further pounded by means of a mortar and pestle and then sieved. The sieved tobacco powder is afterwards gently heated, the mass being turned over frequently to pre- vent its being charred. Ater cooling, lime and ghee are added and the mixture is then passed through sieves of fine meshes. The snuff so prepared is then ready for use. Sometimes musk, boric acid, ammonium salts, scents, etc., are added in varying proportion to the ordi- nary snuff to prepare the scented snuff.

In the Punjab, the dried tobacco leaves are first crumbled into small pieces which are then ground into fine powder. The powder is afterwards soaked in water for a period ranging from 10 to 20 days when fermentation sets in. When the mixture emits a characteristic odour, the fermented stuff is removed and dried. When dry it is pounded in a wooden mortar and pestle and the sifted through cheesecloth. Next, certain ingredients like slaked lime, butter, almonds, pepper, ammonium chloride, etc. are added. Sometimes tobacco dust is also mixed to cheapen the cost of production. This whole mass is then again ground after which it is again passed through cheese- cloth. The grinding and sifting process is repeated until the product attains the desired stage of fineness.

SLATE INDUSTRY

SLATE quarrying gives a means of livelihood to a number of workers along the outer Himalayas, where the foliated rocks though often not true clay-slates, possess an even and perfect fissility, which enables them to be split for slates. In the Kangra district, at Kanyara, work is being carried in a systematic manner by the Kangra Valley Slate Co. The same company work quarries of clay-slates amongst the Aravalli series near Rewari in the Gurgaon district south of Delhi. There are in addition several smaller companies working slate in the Kangra and Gurgaon districts.

Slate mines are worked in the Kharakhpur Hills, Monghyr District, Bihar. The slate worked is often slightly phyllitic and is probably of Dharwarianage. Though not giving the thinnest varieties of roofing slate these quarries produce fine slates for which a more extended use is continually being found for flooring, roofing, ceilings, and for small dishes and curry platters for native use. Enamelled slate slabs for electrical purposes, switch boards and fuse bases are manufactured. Recently a new branch of the business has been opened for the manufacture of school slates.

Slate of good quality and considerable quantity was observed in the valley of the Tuzu River, some 25 miles of Kohima, in the Naga Hills. The locality is somewhat remote for present-day exploitation. It is used by the half civilised local tribes for roofing, mills stones, and other purposes.

Slate is also being worked in various parts of the socalled transition series of rocks of the Peninsula. The principal sources of supply are however: (1) Manbhoom, Monghyr and Singhbhum in Bihar: (2) Karnul in Madras; (3) Tumkar in Mysore; (4) Gurdaspu[r], Gurgaon and Kangra in the Punjab; (5) Alwar in Rajputana; (6) Almora, Garh[wal] and Nainital in the Uttar Pradesh.

SCHOOL SLATES

Of the various applications of slate a[s] indicated above the manufacture of scho[ol] slates is one of the most promising indus[try] if carried out with modern machir[ies]. In the manufacture of school slate the slate blocks as soon as received fro[m] the quarries are cut lengthwise to th[e] proper size because if they are kept asi[de] for a few days in contact with air the[y] lose their property of divisibility into th[in] laminae. The blocks having been cut t[o] the required sizes are worked with [a] mallet and chisel in such a way that th[e] chisel is introduced into the stones in [a] direction parallel to the cleavage plane. In this way the stones are split up int[o] a number of thin even slabs, which a[re] then dressed to the proper shape b[y] being laid on a block of wood with pro[jecting] parts at the ends and sides cut o[ff] with a species of hatchet or chopping knife.

The slate having been cut into prop[er] sizes is then submitted to polishing opera[tion] whereby it is faced with an iron pla[te] with river sand and water. Then it [is] thinly painted with the mixture consis[ting] of 7 parts of linseed oil, 1 of groun[d] ochre, 3 of tar oil and 1 of asphaltu[m]. The painted article is then heated to abo[ut] 200°F., and allowed to cool. Finally it [is] polished with pumice stone and tripol[i]. The polished articles are next beville[d], i.e. the edges on both sides are ground i[n] slanting positions. The finished slabs a[re] fitted with frames made of soft woo[d] having rounded corners, packed in boxe[s] and despatched for sales.

ARTIFICIAL SCHOOL SLATE

School slate now-a-days is made art[i]ficially. For this purpose thin iron pla[te]

is coated with a special type of composition consisting of finely-ground slate, carbon black, silicate of potash and silicate of soda of specific gravity 1.25.

TYPICAL COMPOSITION

Flour emery	30	parts
Slate powder, finely ground	40	,,
Carbon black	10	,,
Silicate of soda Sp. gr. 1.25	20	,,
Silicate of potash	10	,,
Boiling water	20	,,

First prepare the silicate solution by finely crushing the silicate of potash and silicate of soda in the boiling water. Boil the mixture until the silicates are completely dissolved in the water. Now put the slate and emery powder in a little water in a mortar and 10 parts of carbon black. Grind the mixture thoroughly. Then gradually pour the hot silicate solution with vigorous grinding so as to form a sticky paste. Keep this ready.

In the meantime take rough iron plates. Cut them into the usual rectangular sizes. Dip them in dilute caustic soda solution to remove any adhering oil or grease from the surface. Then wash with clean water and dry over fire.

Now take these well dried iron sheets and dip them uniformly with hot slate composition as prepared above. Then take out and keep vertically. After allowing to dry apply a coat of mixed solution by means of a brush. In a similar manner coat the other side of the plate. Keep the plates in vertical state until dry. Now put the coated sheets into a strong solution of brine (salt). In the end wash the sheets with water to remove salt accumulated on the surface.

The slate, thus produced, is to be kept by the side of oven whereby the heat of the fire will produce stone-like mass. Then these are kept in a well-ventilated room for at least one week for drying purpose. Next the slate is furnished with wooden frame.

Another process of making artificial slate is to paint the surfaces of the well cleaned but rough iron plates with following composition:—

Ground slate	20	parts.
Powdered glass	10	,,
Fine, dry quartz powdered	10	,,
Carbon black	10	,,
Oil of turpentine	20	,,
Copal varnish	10	,,

First grind together the slate, glass powder and sand in a stone mortar. Then mix intimately the carbon black. Next add the copal varnish and turpentine oil. Triturate all together. Finally evenly paint the iron plates and dry in the air.

SLATE PENCIL

The common irregularly shaped black slate pencils found in the market are generally made from slate itself; but there is another variety of pencils which are more pleasant to use than the former are manufactured from the slate waste.

In the manufacture of slate pencils (from slate itself), the block as received from the quarries is split up into slabs, 1 to 2 inches thick, which are then sawn into blocks 6 to 7 inches long and 4 to 5 inches wide. With a thin plate of steel and a hammer these are split into plates about one-third of an inch thick, and then passed between to flate-edged kinves to plane them. The plate is next fed to a machine in which it is passed successively beneath a series of grooved cutter, each of which cuts a row of deeper incisions into the slab, until on emerging from the machine its upper side is covered with convex flutings, the channels between which penetrate half through the stone. It is then transferred to a second machine, where its other side is subjected to the

action of a series of similar cutters, by which the pencils are completely rounded and separated from each other. They are next sawed to uniform lengths, the sizes varying from 3½ to 6 inches; and finally pointed on a grind stone. In some cases they are afterwards painted.

The dust and waste, which is said to amount to 90 per cent. of the original material is utilised by grinding to an impalpable powder, which is used for mixing with paper pulp to give its body and enable it to receive a satin surface.

As the stone contains over 30 per cent. of alumina, the refuse is also available for the manufacture of alum.

Another important use of slate waste is the manufacture of slate pencils, which are regarded as superior in quality to that of the pencils directly made from slate blocks.

To manufacture slate pencils from slate waste, the pieces of slates are first of all reduced to fine flour, 60 parts of which are then mixed with 30 parts of flour limestone and 10 parts of silicate of soda. The mixture is kneaded into a plastic mass and forced through a perforated plate, and each pencil is deposited on a grooved slate, the overhanging ends being sawn off, when dry, by passing across a circular saw. The sharpening is done by laying the pencils in a trough, the bottom one being gripped automatically in a holder which revolves at an angle, and the end is held against a rough stone revolving at high speed in water. The finished pencils are lastly packed in wooden boxes and sent to the market for sale.

MANUFACTURE OF CANDLES

CANDLES consist of cylinders of wax or fatty acids surrounding a wick lying true in the centre in order to avoid unequal burning. The wicks are made of cotton threads loosely plaited together and soaked in a solution of boric acid, potassium nitrate or chloride, and ammonium chloride, sulphate, or phosphate. The plaiting causes the wick to curve when burning, and thus they burn away at the ends without causing the flame to smoke. The chemical solution vitrifies the ash of the wick, and the minute glassy particles dropping off from the bent wick leave the end free for the melted fat to ascend to the point where combustion is taking place. In the absence of this chemical treatment the wick burns off short in the flame and causes persistent guttering. Stearine or paraffin candles are moulded in special machines.

RAW MATERIALS

Most candles are made entirely of paraffin wax. For religious purposes beeswax candles are preferred. Where price is not of paramount importance, stearic acid and various blends of waxes are utilized.

Stearic acid is a good hardening agent for paraffin wax candles. It raises the melting point and can be used in any quantity, without impairing the burning quality of the candle. The hydrogenated oils and fats also serve as hardening agents for paraffin wax and are used chiefly for candles which are consumed in glasses. Synthetic or natural resins can be applied in the form of coatings only and are used chiefly for decorative candles.

METHOD OF MELTING

The operation is performed in kettles heated by direct fire or steam. Heating

by steam is always preferable and for this purpose steam jacketed kettles lined with aluminium is most suitable.

When pure paraffin wax is used in making the candle, the melting may be performed in iron or aluminium kettles. But when stearic acid is used in conjunction with the paraffin wax, wooden tubs, earthen crocks, tin, porcelain or aluminium kettles should be used as iron will discolour the stock, lead lined tubes injure the burning quality of paraffin. Hence steam coils made of iron or lead may be used provided the coils are well under a column of water over which the molten materials can float without the risk of coming in contact with them.

When paraffin and stearic acid are employed they may be melted separately or in the same vessel. Very little agitation is required to combine them when they are melted separately. When melting together, it is better to melt the paraffin first if direct heating by steam is employed. But if they are to be melted over a column of water it is immaterial which ingredient is melted first.

MOULDING

Before moulding the wicks are fitted first. Then the moulds should be heated to the same degree as the molten mass by turning on the steam pipe. The steam pipe is then closed and molten stock poured into the tray till it fills the moulds and the tray to about ½" in height. This is necessary to prevent the ends of the candles from turning hollow due to the shrinkage due to cooling. The water pipe is then quickly turned on and the chamber surrounding the moulds is filled with cold water. As soon as the stock in the tray begins to set, it should be loosened from the sides of the tray with a knife and when it gets firm it is removed with a scraper leaving the tray quite clean and the ends of the candles smooth. When the candles are cold enough, the upper racks are placed on the top of the machine in proper position. Then the cam levers of the machine are loosened till the apertures in the receiving and sliding boards are in a vertical line. The crank is then turned when the candles are lifted by the pistons clear of the lower sliding board of the upper racks. The catches are then closed and crank dropped back its original position when the machine is ready for the next operation.

The wicks connecting the candles in the racks and the moulds must not be cut till the candles in the moulds are sufficiently hard to retain the wicks upright. The wicks are cut with a long and sharp knife and the upper racks are removed and the tray is cleansed of the excess stock for the next operation.

SOME USEFUL RECIPES

I

Hard paraffin	60	parts.
Stearic acid, double pressed	35	,,
Beeswax	5	,,

The above are melted together and agitated to insure complete blending. When melted an oil soluble dye of the desired hue is added and then the combination is poured in moulds and cooled. Care in the selection of the dye should be exercised to eliminate "bleeding" or fading, but many good dyes are available. It may be desirable to make up known strength of dyes in blocks of paraffin by merely adding the dye to the melted wax and then pour in moulds, forming blocks of uniform size. This permits easy storing and somewhat facilitates the complete blending of the colour when introduced to the melting kettle.

A better grade of candles are made by increasing the amount of stearic acid and decreasing the amount of paraffin or vice versa.

II

Paraffin wax	60	parts
Stearic acid	40	„

Melt together and stir thoroughly till a clear melt is obtained. If coloured candles are desired, the colour may be added at this stage according to the method already described. Pour into moulds fitted with wicks and chill by a running stream of cold water.

III

Paraffin wax	49	parts.
Hydrogenated vegetable oil	51	„

Melt as above. This will burn for a longer time than ordinary candles.

TRANSPARENT CANDLES

I

Paraffin wax	70	parts.
Stearine	15	„
Petroleum	15	„

Melt together paraffin wax and stearine in a steam jacketed aluminium kettle and when molten add the oil and stir thoroughly to make a uniform mixture. Pour into moulds.

II

Paraffin wax	90	parts.
Stearine	5	„
Petroleum	5	„

Process as above.

To prevent the trickling of burning candles, the candles may be dipped in the following mixture:—

Magnesium sulphate	15	parts.
Dextrin	15	„
Water	100	„

The solution dries quickly and does not affect the burning of the candles.

OPAQUE CANDLES

To make opaque candles Beta na phthol is used in small proportions and is added to the paraffin to make the pure paraffin candles look like composition candles. The paraffin candle looks more or less transparent whereas the stearin candle or the composition candle looks opaque. The opaque candle is valued more and is also priced higher than the paraffin candle. To deceive the market, therefore, beta naphthol is added in small percentages to the paraffin mass so that, without any appreciable change in the the melting point or in the cost, the candle looks better from the dealer's point of view. The same effect is also obtained by adding methylated spirit in small quantities.

BOOT POLISH

BOOT polish is mainly used as a preservative for leather producing bright lustre. It also makes the leather waterproof.

RAW MATERIALS

In the manufacture of boot polish the following ingredients are mainly required:—

Carnauba wax, shellac-wax, beeswax, hard paraffin, soft soap, turpentine oil.

Nigrosine (oil soluble), Bismark Brown and Waxoline mahogany.

EQUIPMENTS

The principal equipments required are:—

1. Three Iron Pans.
2. 3 Ladles (Wooden).
3. Gallon Measure.
4. Scales and Weights.
5. Oven.
6. Mugs with spouts.
7. Tins etc.

FORMULA

Carnauba wax	1	lb.
Shellac wax	2	lbs.
Beeswax	1	lb.
Hard paraffin	2	lbs.
Soft soap	1	lb.

Turpentine oil	1½	gallon.
Oil soluble dye	½	ounce.

Weigh out the ingredients separately and keep ready.

Next place one cast iron pan over the fire and put the waxes in it. Apply gentle heat when they are all melted add the soft soap. Stir lightly until the soap goes into solution and all bubbles are more or less disappeared.

In the meantime measure out the turpentine oil in a bucket and dissolve in it the particular dye (say nigrosine for black, Bismark Brown for brown and waxoline mahogany for tan). Then add the turpentine oil slowly and cautiously *into the molten waxes Be careful that* the flame may not come into contact with the oil or its vapour. Stir lightly for a few minutes so as to mix up with the waxes

Next remove the pan a few yards away from the fire but continue stirring so that the waxes may thoroughly mix up with the oil and also allow the temperature to come down a few degrees. The mass now just begins to thicken.

At this stage take the molten mass in a mug and pour ino the tins arranged in rows. Allow the mass to cool and solidify: then put over it wax paper or tin foil and put up the lid tightly.

I

Carnauba wax	5	lbs.
White beeswax	5	,,
Hard paraffin	10	,,
Soft soap	2	,,
Turpentine oil	5	gallons
Colour (oil soluble)	2	oz.

Proceed as above.

II

Carnauba wax	½	lb.
Shellac wax	1	,,
Beeswax	1	,,
Ceresin wax	1½	lbs.
Orange dye (oil soluble)	1	dram.
Turpentine oil	1	gallon.

Proceed as above.

To reduce the obnoxious odour of turpentine oil add a little nitrobenzene towards the end.

SHOE CREAM

Shoe cream is prepared in the same way as shoe polish. In this case a small proportion of the turpentine oil being replaced by water and an alkaline emulsifying agent: the two latter are brought to the boiling point, the waxes are melted in a separate vessel, the turpentine stirred into the waxes, and the wax-turpentine then added to the boiling water, the whole being, stirred continuously until cold, when it sets to a soft creamy mass.

WHITE CREAM

Water	1½	gallons.
Pearl ash	6	oz.
Castile soap	4	,,
White montan wax	10	lbs.
Oil of cassia	1	quart.
Turpentine oil	4	gallons.

BROWN CREAM

Water	3	gallons.
Pearl ash	½	lb.
Soft soap	½	,,
White beeswax	9	lbs.
Shellac wax	3	,,
Turpentine oil	5	gallons.
Oil of lavender	½	lb.
Wax soluble brown	½	oz.

For black use nigrosine (oil soluble) and for tan use waxoline mahogany.

METAL POLISHES & THEIR PREPARATION

IN recent years the application of metal polishes is for cleaning brass and other metals common in the household is gradually gaining popularity. The old fashioned way for restoring the bright surface was simply to rub off the dull part, but the modern preparations aim at dissolving the grease and oxide, thus enabling the

polishing basis to work more easily and quickly.

The properties of a good metal polish will be such that it has excellent cleansing properties and removes much of the dullness from metals by the abrasive and solvent actions. The polish when applied over a metal article, will dry up quickly leaving a fine coating and on rubbing with a piece of dry cloth brings out a high lustre.

CHOICE OF ABRASIVE

The choice of abrasive is very important in making a satisfactory metal polish, and the variety chosen depends upon the metals on which it is to be used. For the metals, like silver, a jeweller's rouge or a precipitated chalk is used. For brass or nickel a slightly coarser abrasive is valuable, such as the colloidal clay in the formula, or a fine silica. A dye is often added to commercial polishes in addition to the other ingredients.

If a non-colloidal abrasive is to be incorporated, it should be mixed with the oleic acid and naphtha instead of with the water and considerably higher proportions of acid and triethanolamine will have to be used.

DIFFERENT VARIETIES

There are many varieties of metal polish selling in the market, such as:—

1. Liquid type.
2. Paste type.
3. Powder form.
4. Polishing soap.

Let us deal with each variety one by one.

LIQUID METAL POLISH

I

Naphtha	62	oz.
Oleic acid	1	„
Silica powder	7	„
Triethanolamine oleate	½	„
Ammonia (26°Be)	1	„
Water	1	gallon.

In one container mix together the naphtha and oleic acid to a clear solution. Dissolve the triethanolamine oleate in water separately stir in the silica and then add the naphtha solution. Stir the resulting mixture at a high speed until a uniform creamy emulsion results. Then add the ammonia and mix well, but do not agitate as vigorously as before.

II

(a)	Oleic acid	16	parts.
	Mineral oil	16	„
	Methylated spirit	40	„
(b)	Ammonia (sp. gr. 0.910)	8	„
(c)	Whiting	20	„

Add (b) to the mixture (a) with agitation. Add (c) to this emulsion in small portions. Strain and put in tin cans.

III

Ammonium linoleate	20	lbs.
Oxalic acid	2	„
Ammonia fort	4	„
Water	150	„
Naphtha	10	„
Silica	60	„
Methylated spirit	5	„

Heat the water to 70°C. Dissolve the oxalic acid, add the silica and stir until dispersed. Add the ammonia and stir for a few minutes keeping at 70°C. Then add the ammonium linoleate and stir until dissolved. Add the naphtha slowly and stir. The mixture becomes very heavy. The methylated spirit is then added slowly until the desired body and viscosity are obtained.

PASTE METAL POLISH

Hard paraffin	2	oz.
Ferric oxide	8	„
Lubricating oil	6	„
Oleic acid	1	„
Oil of mirbane	½	dr.

Melt the paraffin with the lubricating oil and mix with the ferric oxide, pre-

viously well-levigated; add the acid and the oil of mirbane.

II

Tripoli powder	10	lbs.
Pipeclay	10	„
Pumice flour	5	„
Pale oleic acid	40	fl. oz.
Kerosene oil	30	fl. oz.

Mix with sufficient petroleum jelly to produce a paste of the usual consistency.

POLISH POWDER

Kieselguhr	4	oz.
Tartaric acid	2	„
Prepared chalk	2	„
Ferric oxide	2	„

Mix.

ALUMINIUM POLISH

I

Stearic acid	10	oz.
Fuller's earth	10	„
Tripoli powder	60	„

Mix.

II

Silica precipitated	56	parts.
Kerosene oil	28	„
Oleic acid	14	„
Stearic acid	14	„
Lard	14	„
Talc	107	„

Mix the greasy ingredients, then mix with the solids.

METAL POLISHING SOAP

I

Kieselguhr	125	parts
Cream of tartar	50	„
Calcined magnesia	75	„
Coconut oil soap	750	„

Melt the soap in a little water by the aid of heat then add the powders, previously mixed, and mould into suitable cakes.

II

Ferric oxide	5	oz.
Precipitated chalk	15	„
Kieselguhr	10	„
Coconut oil soap	70	„

Prepare as above. This is suitable for cleaning silver and nickel ware.

PRINTING ROLLER

IT is of the very greatest importance that the printer should possess thoroughly good rollers for without them it is not possible to produce respectable work.

QUALITIES OF A GOOD ROLLER

The following qualities should be possessed by a good roller:—

1. In shape it should be perfectly cylindrical, and exact in mechanical form from one end to the other.

2. It should never shrink or swell. Shrinking or swelling causes loss of time in setting the roller in the machine.

3. Its elasticity, if not absolutely perfect, must at least be good, so that it can adapt itself perfectly to the pressure of the forme.

4. It must have a sufficiently strong affinity for ink to take instantly a sufficient supply from the ink table to the forme.

5. It should be able to withstand the action of proper detergent.

6. It should preserve these qualities under varying conditions of temperature, and of humidity of atmosphere.

In the older variety of rollers glue and treacle are the principal ingredients in the newer, gelatine and glycerine. The latter is now in almost universal use.

With regard to the constituents, glue is hard when cold. To render it soft and springy fluid ingredients are used. Treacle is adopted for admixture with the glue to keep it in a soft, elastic condition. Both the glue and treacle in a roller when kept in a dry place rapidly become hard. Constant washings with water become necessary, but the unavoidable evaporation of the liquids also soon des-

troys the power of the glue to gelatine. The composition then acquires a hard face and cracks.

Glycerine, on the other hand, is a permanent liquid which does not volatilize or lose bulk. With several admixtures it forms compounds which are insoluble in water, which is one of its chief advantages in roller making. It may be deprived to a certain extent of its property of absorbing moisture, and rollers made from its modified substance will not swell or refuse to take ink when there is an excess of dampness in the atmosphere.

TYPICAL RECIPES

The following recipes for making roller composition have been found satis factory but much depends on the quality and purity of the ingredients used.

I

Glue	9	parts by weight.
Treacle	14	,, ,,
Paris white	1	,, ,,

II

Glue	2	parts by weight.
Refined sugar	10	,, ,,
Glycerine	12	,, ,,

The dry glue must, after being weighed out, be put in cold water for about 20 minutes. Then it is taken out and placed upon a board, covering it with a printer's damp blanket, and let it remain the whole night. After this it will be of the consistency of rubber.

Now put the kettle on and bring the water to all but boiling point, and keep it at that temperature. Then put the glue into the composition pot and stand the latter in the water. As the glue melts, keep it stirred till all traces of the water are out of it. Then add the glycerine, stirring it till it is well mixed with the glue. Next add the sugar and keep the whole well stirred for 30 to 40 minutes. If it remains much longer it will probably "Candy."

CASTING THE ROLLER.

The appliances for roller casting are a melting kettle and roller moulds. The melting kettle which should be provided with a stirrer, may hold from 2½ to 10 gallons of melted composition. It may be heated by steam, by gas, or by a coal fire.

The melting kettle consists virtually of two vessels. One within the other. They are separated by water, so that the inner one is not touched by the fire.

The moulds require to be most accurately bored and fitted. They should have vise-handle "dogs" and stout screws. Hand-press roller moulds are made of either, cast-iron or stout brass. They range from 12 to 30 inches in length. Machine roller moulds are generally of cast-iron. These vary in length from 36 to 72 inches.

PREPARATION BEFORE CASTING

Casting should always be done in a warm place. Before consigning it to the melting pot, the composition should be cut up into small pieces to facilitate quick melting.

After the composition has been put in the kettle and whilst it is melting the mould should be prepared. Care should be taken to see that it is perfectly free from dust or dirt. It should then be heated just hot enough to comfortably bear one's hand upon it. Carefully grease all over the inside with sperm oil, using as little as possible. The roller stock is then placed inside the mould. It should be painted with white lead, which must be allowed to dry, and a piece of coarse twine or tape wound round it. There will then be something for the composition to hold on to and keep there, otherwise it might come off the stock.

The mould should stand in an upright position when casting, and the composi-

[illegible] the [illegible] the sides [illegible] the composition [illegible] just fluid enough to pour it in the spindle. If it is poured too hot and too quickly air bubbles will probably make their appearance.

In pouring the composition into the mould, see that the spindle of the roller is exactly in the centre, so that there will then be an equal amount of composition all round the spindle. Pouring slowly prevents any holes and flaws. The mould is filled an inch or two higher than is required, to allow for shrinkage and trimming.

When the roller is cooled sufficiently it is carefully removed from the mould and trimmed at the ends with a sharp knife.

[illegible]

[illegible]

Immediately after a roller is cast, it is not ready for use. It must be seasoned. Seasoning is just as much a part of its manufacture as the casting of it. The object of seasoning is to obtain toughness and power of resistance to the pull of the adhesive ink tablet. The time required depends on the condition of the weather. When the air is saturated with moisture, it is risky to use it.

When the new roller is drawn from the mould the surplus composition should be trimmed from each end, and the roller put away carefully. Keeping it out of contact with anything is likely to dent or injure it.

PHARMACEUTICAL R[illegible]

TONIC TABLETS

Calcium hypophosphites	50	grains.
Manganese hypophosphites	25	„
Potassium hypophosphites	25	„
Iron hypophosphites	25	„
Quinine hypophosphites	12½	„
Strychnine	⅛	grain.
Potato starch, in powder	200	grains.
Sucrose, in powder, to make	850	„

Mix the hypophosphites of calcium, manganese and potassium with strychnine, and grind well together in a mortar. Dissolve the iron hypophosphite in a little water, granulate the mixed powders with the solution, and dry the granules. Powder the dried granules, and pass together with the starch, through a sieve, and make up to the required weight with sucrose. Make into 800 sugar-coated tablets.

STAINLESS IODINE OINTMENT

Iodine	1	oz.
Oleic acid	4	„
Soft paraffin	14	„
Hard paraffin	1	„

Dissolve the iodine in the oleic acid and mix intimately with the paraffin.

COUGH DROPS

Brown sugar	10	lbs.
Tartaric acid	2	oz.
Cream of tartar	½	„
Water	3	pints.
Aniseed flavouring	q.s.	

Melt the sugar in the water, and when at a sharp boil add the cream of tartar. Cover the pan for 5 minutes Remove the liq. and let the sugar boil up to crack degree i.e., if a quantity of syrup is allowed to drop on the cool floor it at once sets to a hard mass. At this stage turn out the batch on an oiled stone slab, and when cool enough to handle mould in the acid and flavouring. Pass it through the acid drop rollers, and when the drops are chipped up, and before sifting, rub some icing with them.

LIQUID MEDICATED SOAP

Coconut oil	1	oz.
Potassium hydroxide	1	dr.
Sodium hydroxide	1	„
Thymol	5	grains.
Distilled water to produce	6	ounces.

Dissolve the sodium hydroxide in one ounce of distilled water and dissolve in a separate vessel the potassium hydroxide in another ounce of water. Now place the coconut oil in a suitable pot and pour the sodium hydroxide solution stirring vigorously until all the sodium compound has been absorbed by the oil. Then add the potassium hydroxide solution and stir so as to saponify the whole of the [illegible] oil Then incorporate the thymol and [illegible] the soap to stand for 15 minutes. Afterwards add the remainder of the distilled water.

SCURF POMADE

Salicylic acid	30	grains.
Borax	15	„
Soft paraffin	1	oz.
Balsam of Peru	30	grains.
Oil of cinnamon	3	drops.
Oil of bergamot	10	„

Mix.

AGNIMUKHA CHURNA

Asafoetida	1	part.
Acorus calamus	2	parts.
Long pepper	3	„
Ginger	4	„
Ajowan	5	„
Chebulic myrobalan	6	„
Plumbago root (chitramula)	7	„

Reduce the ingredients into powder form and pass through a cloth.

Dose 20 to 40 grains with whey.

CORN SALVE

Benzoated lard	11	oz.
Yellow beeswax	2	„
Wool fat	2	„
Salicylic acid	8	dr.
Methyl salicylate	2	„

Triturate all the ingredients in a mortar and then pack.

FLUID EXTRACT OF PUDINA

Pudina, in coarse powder	100	grms.
Alcohol	600	c. c.
Distilled water	300	„

Mix 600 c.c of alcohol with 300 c.c. of distilled water, and having moistened the powder with 350 c.c. of the mixture, pack it firmly in a cylindrical percolator, then add enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for 48 hours. Then allow the percolation to proceed, gradually adding menstruum, using the same proportions of alcohol and water as before, until the pudina is exhausted. Reserve the first 850 c.c. of the percolate.

Distil off the alcohol from the remainder by means of a water-bath, and evaporate the residue to a soft extract; dissolve this in the reserve portion, and add enough menstruum to make the fluid extract measure [illegible]

[illegible] GLASS [illegible]

[illegible] can be readily [illegible] by [illegible] following compositions.

	By	parts.	
[illegible]	1	1	1
Lead	1	1	1
Tin	1	1	1
Mercury	1	2	8

First melt the lead and tin, and then add the bismuth. After removing the dross, pour the mercury into the alloy and stir vigorously. Leaves of Dutch metal are sometimes introduced into the mixtures according to the colour to be imparted to the globes. For silvering the globes, heat them carefully to the melting point of the silvering amalgam; then pour a small amount of the amalgam into the cavity of the globe, and swing it to and fro until its entire surface appears covered.

POLISHING PASTE FOR ALUMINIUM ARTICLES

Precipitated silica	8	oz.
Kerosene	4	"
Oleic acid	2	"
Stearic acid	2	"
Lard	1	"
Talc powder	1	"

Melt together the oily ingredients and stir in the others until a smooth paste results. This mixture is especially recommended for aluminium.

WHITE STAMPING INK FOR EMBROIDERY

Zinc white	1	oz.
Mucilage of acacia	½	"
Water	3	"

Triturate the zinc white with a small quantity of water till quite smooth, then add the mucilage and the remainder of the water. Add a few grains of boric or benzoic acid as preservative.

SYRUP POWDERS

The method of the manufacture of different syrup powder is identical with the exception of the flavour and colour.

Base

Powdered citric acid	1	oz.
Powdered refined sugar	15	"

To make the flavoured powders, proceed as follows:—

Put about 4 oz. of the powder into a mortar and spray or drop the mixed flavouring materials over it slowly mixing well. When all have been added, gradually add the remainder of the acid, mixing well after each addition. The colour should be dissolved in the flavouring mixture before adding the acid. When well mixed, [illegible] has dried out [illegible]. Next put up in glass [illegible] stoppers, but may be put in [illegible].

MOTOR GREASE

(a) Rosin oil	24	parts.
White Mineral oil	15	"
(b) Caustic potash lye (10°Be)	3	"
(c) Slaked lime	9	"
Mineral oil	15	"

Mix (a) thoroughly in a bottle. Add (b) slowly, stirring vigorously. Grind (c) and add to the mixture of (a) and (b). When the gel is formed, let stand to next day.

DEODORISING SPIRIT

Spirit	1	gal.
Powdered quicklime	½	oz.
Powdered alum	2	"
Wood charcoal	1	"

Mix all together and keep aside for a few days in a covered vessel and then filter.

MUKHBILAS

Coriander seed	1	tola.
Aniseed	1	"
Parsley	1	"
Nutmeg	1	"
Ajwan	1	"
Saffron	1	"
Seeds of cardamom minor	1	"
Cloves	1	"
Dry rose petals	1	"
Chua	1	"
Camphor	1	"

Take one tola each of the ingredients excepting the last two and soak them in good rose water for 12 hours. Then bray them together to a paste form and incorporate chua and camphor.

KHUS KHUS ESSENCE

Procure 12 oz. of Khus khus root. Free it from dirt and pound it finely. Now soak the powder in 16 oz. of alcohol and keep into a wide-mouthed stoppered bottle. After a month filter through filter paper and keep in bottles for use.

TAPIOCA JELLY

Wash thoroughly 10½ oz. of tapioca, and then soak it for 5 to 6 hours in 1½ pints of fresh water; add the peel of one lemon and place the whole on the fire. Boil slowly until a clear solution is obtained, and then flavour it with lemon juice, wine, and sugar.

—IN THE FIELD OF INVENTION

MAGNETIC METHOD OF EXTRACTING GOLD.

A magnetic method for separating gold from hitherto unworkable low-grade ores is described (Sci. Newsletter, 1949,56,153).

The gold in cyanide solution is adsorbed on activated carbon which is rendered magnetic, whether through the incorporation of ground magnetite or by impregnation with an iron salt which is subsequently reduced, leaving pure iron in the pores. After the carbon has adsorbed the dissolved gold, a magnetic separation is effected. With larger carbon particles losses are correspondingly reduced. The method obviates the appreciable losses entailed by flotation treatment of low-grade ores.

—JOURNAL OF SCIENTIFIC AND INDUSTRIAL RESEARCH

EXTRUSION METHOD OF BUTTER MANUFACTURE.

A unique method of manufacturing butter is being tried in Australia with a new Australian machine (Agri. Newsletter, Australia).

The method involves the use of extreme cold extrusion instead of churning. Milk is handled in the usual way until after it passes through a separator. Then the cream is piped to a special cream separator, which divides it into 80 per cent butter fat and 20 per cent butter fat skim. Butter fat is carried to a vat which standardises it for salt and moisture content. During the process a portion of the skim is fed back into the butter fat. Then, under vacuum pressure, the butter fat enters the extruder where, in a brine solution at a temperature below zero, it is transferred into butter. The butter comes out of the machine at 30°F.

COMPRESSED TALCUM STICK

An application of talcum powder before using the electric shaver absorbs moisture and oil from the surface of the skin. A method of making talcum powder sticks is given by U. S. Patent 2390,473. Sticks of powder are formed by pressure varying from 450 lbs to 600 lbs per sq. inch. The sticks are then coated, except on the end, with a solution of a synthetic resin. This process makes it unnecessary to incorporate a binder in the powder as the coating prevents crumbling of the stick. Vinyl resins (polyvinyl chloride or polyvinyl acetate) are prepared as coating materials, although other film-forming resins such as cellulose ethers or starch esters may be employed. A suitable coating solution which may be applied by spraying consists of 22 parts of polyvinyl acetate dissolved in 100 parts of ethyl acetate. The film of resin must not be too thick because it should wear away at the end of the stick at the same rate as the powder.

—PHARMACEUTICAL JOURNAL.

NEW CHEMICAL PROCESS FOR POLISHING METALS.

Metal products can now be given a bright reflective surface without the need of mechanical or electrical operations, it is reported. In the new process the product is merely dipped into a chemical solution and when withdrawn a few minutes later is described as having a high, mirror like lustre. Chief advantage claimed for the new process in production is its simplicity—it may eliminate one to four or five production steps in the finishing of a metallic product. Metals that can be polished successfully by the new process are said to include brass, copper, monel, nickel, and aluminium.

—OIL, PAINT & DRUG REPORTER.

INSULATING WOOL FROM ARECANUT HUSK

Investigations carried out in the Forest Research Institute, Dehra Dun, have proved that arecanut husk can, by a simple process, be converted into insulating wool as well as hard boards which compare favourably with foreign products.

About 5000 tons of arecanut husk available in the country at present go to waste. It has been found that by a simple process of beating the husk with a wooden mallet it can be converted into satisfactory insulating wool.

MANUFACTURE OF FORMALDEHYDE

The usual method for the production of formaldehyde from methyl alcohol has been modified to make possible the recovery of hydrogen and its re-use for the synthesis of alcohol (Chem. Age, 1949, 64, 418).

Dehydrogenation of alcohol by passage through a copper tube heated by an electric circuit, perferably in the presence of water vapour to avoid poisoning of the catalyst, provides a method for the recovery of hydrogen mixed with a certain amount of carbon monoxide. With the use of oxygen along with catalysts such as copper, silvered copper, platinised copper or silver, the process is much more effective. Oxidation and dehydrogenation in the presence of hydrogen as diluent give yields corresponding to those obtained from the normal air process but with the additional formation of hydrogen. The results confirm the possibility of producing formaldehyde with practically the same apparatus and with the same yield as is normally obtained. Air is replaced by mixture of oxygen and residual gas containing hydrogen, and by increasing the rate or volume of gases in circulation there is very good recovery of hydrogen. Since the cost of the oxygen used is less than half that of the hydrogen recovered, the method offers economic advantages.

FORMULAS, PROCESSES & ANSWERS

TARTARIC ACID FROM TAMARIND

[illegible] B.L.V., [illegible]—Desires to learn a process of making tartaric acid.

The green fruits that may be received in bulk are given a preliminary washing where this may be required to remove dirt, etc. and subsequently pulped in a suitable equipment to produce a homogeneous mass. When whole fruits are employed, a greater time would be necessary for the chemicals to act on the tissues, but when the reagents have acted effectively, drops of moisture could be seen on the surface. This reaction of plant tissues to these chemicals is correlated with both the time of exposure and the quantity of the reagents. The inorganic gases bring about plasmolysis even under low concentrations, the same being completed in about 6 hours which can also be reduced under certain conditions. At the end of this period, the tissues are less turgid and part with a portion of the water initially present more readily than before The entire mass is therefore treated in a hydro-extractor to remove as much of the juice as possible, the resulting solid being dried either in the sun or at about 50°C under artificial heating. Generally, drying is complete in about 36-40 hours, so that the dried mass is conveniently stored. The utilisation of the solid for extracting the residual acid could be carried out subsequently. For this purpose, the material is either leached in open vats or preferably in closed vessels. In this case extraction with steam is not quite essential. The prevailing temperature would suffice, since the acid is highly soluble even in cold water The resulting leachate or extract is still rich in tartaric acid.

Treatment of Aqueous Extract: The extract secured either by centrifuging the plasmolysed fresh material or by leaching out the residual dried solid, contains among other soluble components, albuminoids which interfere with the precipitation and purity of the lime tartrate, besides mechanical impurities derived from the fruit itself in the form of tin pulp. The extract is next boiled for a short interval to precipitate the solids. This is then filtered. The filtrate contains chiefly tartaric acid.

Lime Tartrate from Extracts:—The clarified extracts obtained in the above manner contains tartaric acids varying between 2.5 and [illegible]%. For several reasons it does not appear worthwhile to concentrate this extract. It is advantageous to precipitate the acid as its lime salt through the addition of lime or chalk. In this case however, the tartaric acid content in the extract must be determined preferably as the available cream of tartar, so as to ascertain the amount of lime or chalk to be added to the stuff. Having calculated the exact amount of lime to be mixed the clarified extract is treated with the required quantity of lime in the form of milk of lime or with the calculated amount of chalk, so as to neutralise the acid. It is of the greatest importance that the chalk or lime employed must be highly pure, otherwise the impurities as iron or magnesium, would contaminate the final product. The neutralisation of the tartaric acid in the extract is an important item and requires careful control. When the neutralisation is complete as indicated by litmus, the extract becomes generally turbid and affects the purity of the lime tartrate It is therefore necessary to neutralise the extract till it reacts weakly acidic. The quantity of lime added will thus be less than what is quantitatively required for neutralisation. In this case, the extract is clear. Another advantage secured by keeping the reaction acidic in the precipitation of the lime tartrate relates to the fact that the later which is usually granular though in a fine state of division, does not cake on drying. When the neutralisation is thorough and complete as determined by litmus, the impurities precipitating with the lime tartrate and in cake formation, when drying. The granular precipitate obtained in this manner is easily filtered in a filter-press, following a preliminary decantation if necessary. The precipitate is then washed with cold water and dried.

TOFFEE

1701 N.H.T., Bombay—Wants to have good formulas of making toffee and hair fixative.

Sweetened condensed milk	31	lbs.
Full cream milk	1	quart.
Sugar refined	3½	lbs.
Glucose	4	"
Butter	½	lb.
Vanilla and salt to flavour	q.s	

Cook to crack all the ingredients together in an enamelled vessel except the last two. Then add the butter and vanilla essence. Spread the mass uniformly over a marble table and cut into cubes of required size. Wrap in oil paper.

HAIR FIXATIVE

Gum Benzoin	100	oz.
" Mastic	10	"
" Sandarac	50	"
Resin, pale	200	"
Amber liquid	5	"
Jasmine synthetic	5	"
Rectified spirit	4	gals.

Rub down the solids, and transfer to a bottle containing 600 c.c. of alcohol. Place the bottle in hot water, and shake occasionally until solution has been effected. Cool and filter. Add the perfumes and alcohol to make the required volume.

SCENTED BETELNUT CHIPS

1717 N.A., Pudukottai—Wishes to have a method of producing scented betelnut chips and coffee powder.

[illegible] and then mix with [illegible] of glycerine. Next put some [illegible] pink [illegible] the ammoniated carmine solution and finally perfume with menthol, eucalyptus oil, [illegible], etc., the proportions of which may be ascertained by a couple of trials.

COFFEE SUBSTITUTE

Coffee bean powdered	33	parts.
Sugar powdered	5	„
Roasted peanuts powdered	62	„

Mix.

ROASTED COFFEE

Before roasting the beans after being husked are sorted. They are then put into a revolving cylinder. The beans are then carefully roasted by gradually heating the cylinder. During this time the cylinder is made to revolve. The heating is continued until the aroma is well developed and the toughness destroyed. Too much heat is avoided, as the volatile and aromatic properties of the coffee, and, consequently the flavour, are thereby injured; whilst on the other hand, if the berries are roasted too little, they produce a beverage with a raw green taste, very liable to induce sickness and vomiting. When properly roasted, coffee has a lively chocolate brown colour, and should not have lost more than 18% of its weight by the process. If the loss exceeds 20% the flavour suffers in proportion. The roasted coffee should be placed in a very dry situation, and excluded from the air as soon as possible because it loses flavour by keeping and also powerfully absorbs moisture from the atmosphere.

SCENT FOR CHEWING TOBACCO

1783 P.S.K., Karur—Wants to have a formula of scent for chewing tobacco.

Rose otto	2	dr.
Musk flora	3	„
Musk liquid	½	oz

Mix.

CASTOR OIL TABLET

1788 S.R.S., Baroda—Wants to know a formula of preparing castor oil tablet.

Refined castor oil	100	gr.
Sugar	200	„
Chocolate	100	„
Tincture of vanilla	q.s.	

Incorporate the castor oil with the chocolate; add the sugar, with which the tincture of [illegible] ingredients well together [illegible] tar, and while soft place [illegible] desired size on a cold ointment [illegible] cool.

NON-DELIQUESCENT TABLE SALT

1793 S.C., New Delhi—Desires to know a process of making non-deliquescent table salt.

The impurities in common salt which cause deliquescence are magnesium chloride and calcium chloride, and these cannot be eliminated by purification except at great expense. If 3 per cent. of a carefully prepared mixture of potassium sodium and calcium phosphates is added this will convert the chlorides into phosphates and also, by the dry nature of the calcium phosphate, make the salt naturally somewhat less prone to absorb moisture. Another method of making the salt non-deliquescent is to estimate the amount of magnesium and calcium chloride present in the consignment and then add the chemical equivalent of sodium carbonate and phosphate to convert these into dry carbonates and phosphates. De-sodium hydrogen phosphate may be used as the phosphate. The salts are mixed in and the whole dried at 100°C. The amount of phosphate present varies a little. It may be varied from 3 to 4 per cent. and not more than this.

CLOTH STAMPING PASTE

1826 D.C.M., Dacca—Wants to have recipes of cloth stamping paste.

Cloth stamping inks are prepared in various ways, of which the inks made with mineral colours and an oily basis are generally used.

The following recipes are recommended:—

BLUE

Ultramarine blue	5	lbs.
Linseed oil	3	„

Reduce the ultramarine to an impalpable powder, and mix with the linseed oil.

GREEN

Verdigris	6	lbs.
Oleic acid	1	lb.
Olive oil	3	lbs.

Rub the verdigris to very fine powder, mix the oleic acid with it, and, after a few minutes, the olive oil.

RED

Vermilion	3	lbs.
Linseed oil	1	lb.
Olive oil	4	lbs.

Prepare as above. All the above inks should be well shaken before pouring on the pad.

[illegible] stirring, [illegible] per cent, at [illegible] the operation being performed in a [illegible] vessel kept cool by means of [illegible]. After leaving at rest for two or three [illegible] the mass is gradually thinned down with [illegible] and further diluted by stirring in a thin stream of luke-warm soda solution, about 3 times a crystallised soda to each measure of acid used being employed. The finished product settles out on being left over-night.

The product, which is either completely soluble in cold water or readily emulsifiable is employed in dyeing.

The reactions which take place are complicated, and the sulphonated oil contains a mixture of several substances.

SPIRIT GUM FOR THEATRICAL USE

1853 V.V.R., Jamshedpur—Wishes to have a formula of spirit gum for theatrical use.

White rosin	½	oz.
Tolu balsam	½	"
Gum benzoin	½	"
Gum Sandarac	½	"
Rectified spirit	4	"

Dissolve the resins in the spirit, strain and allow to settle until clear.

PYROTECHNIC CASCADES

1864 S.R.M., Kumbakonam—Wants to know a recipe of pyrotechnic cascades.

	1½" Case.	2" Case.
Granulated saltpetre	18	16
Charcoal	4	4
Sulphur	2	3
Iron borings	6	7

Mix.

BOBBIN ENAMEL

1900 P.W., Bulsar—Wants to have a recipe of bobbin enamel.

Shellac	120	parts.
Alcohol	180	"
Castor oil	1	part.
Suitable pigment	20	parts.
Toluene	1	part.

Mix in a stoppered bottle and keep aside for a few days. Then strain through a cloth [illegible] bottle for use.

[illegible]

Sugar [illegible]

Cut the [illegible] for 12 hours in the water, then [illegible] Heat gently on a water bath to [illegible] and then incorporate barium [illegible] thoroughly. Lastly pour into a [illegible] tangular tin box.

REFINING CHINA CLAY

1930 J.G.W., Abu Road—Wants to have [illegible] process of refining china clay.

China clay may be refined by washing [illegible] deposit in a strain of water either [illegible] down the sides of the pit over the clay [illegible] or applied by monitors or jets worked [illegible] cally or from pumps at a pressure of 80 to [illegible] lbs. per sq. inch. These monitors swing [illegible] ball and socket joints, and are directed by hand, being kept in constant motion in order to disintegrate the clay ground and to secure by judicious operation a blended and uniform product. Usually the work of disintegration is further aided by men working in the clay gullies or "strakes" with hoes and chisel pointed picks known as "dubbers".

The resulting clay-stream together with a good deal of coarse disintegrated rock material flows to the lowest point of the pit, either into sand-pits where the separation of the sand is effected, or into a dump, whence it is pumped by centrifugal sand or gravel pumps into large rectangular boxes with hopper bottoms in which the sand is allowed to accumulate. The sand is subsequently hauled up an incline by incline waggons or automatic hopper-skips and deposited on the greyish white dumps.

The overflow from the sand-pits or boxes is pumped to the surface by means of plunger pumps or centrifugal sherry pumps to several series of wooden launders or concrete channels called "drags" "Micas", in which are deposited first the finest sand and secondly the mica flakes and grains of coarse, imperfectly disintegrated clay, while the bulk of the clay is carried along in suspension. If the "wash" is very thick it is, prior to passing the drags, diluted with clean water until the percentage of clay is only 2 or 3 per cent. (by weight) in order that the impurities may settle more effectively.

At intervals the wash is diverted and the micas are cleaned, the sediment either running to waste or to a subsidiary settling plant, whence the clay obtained is known as "mica clay" or simply "mica," and is regarded as a by-product in the industry. The quality of this clay naturally depends on the care extended upon its treatment, and many different grades are marketed for the manufacture of the coarser varieties of pottery, coarse paper, alum cake, etc.

The clay wash or slip, after passing the micas, is successively thickened in large circular settling pits to the consistency of clotted cream, and contains 60 to 70 per cent of water. Further settlement takes place in rectangular storage tanks above the drying kilns, and when the thick slurry has been dehydrated until it contains about 50 per cent. of water, it is either run directly or ladled into wagons and conveyed to the drying kiln

The kiln is usually a building 200 ft. long having a fire brick floor or pan from 12 to 18 ft. wide, with 10 to 12 longitudinal flues running beneath. These are heated at one end by coal furnaces from which the gases generated travel this length of the kiln to a stack at the other end The thickness of the layer of clay to be dried varies from about 10 to 12 inches at the hot end to 5 to 7 inches at the cool end of the kiln. When half dried the clay is scored into rectangular blocks by means of a hoelike cutter. When the moisture content has been reduced the blocks are stored in shed ready for packing.

The method of mechanical purification of china clay as outlined above is relatively simple, inexpensive and efficient, and whilst the thickening process is slow, the long contact of the clay with water followed by the heat treatment is stated to produce a more plastic and workable clay than if the partly thickened slip is filter-pressed and rapidly dried.

AGARBATTI

1932 S.R., Gorakhpur—Wants a good formula of agarbatti.

Musk	10	grains.
Ambergris	10	"
Powdered benzoin	1	oz.
" camphor	1	"
" cascarilla	1	dr.
" nitre	1	"
" charcoal	2	oz.

Mix and make in a thin paste with mucilage of tragacanth, when sticks are made by dipping thin wooden splinters into the emulsion.

PAIN BALM.

Yellow vaselin	24	oz.
Methyl salicylate	2	"
Oil of cajuput	1	"
Oil of eucalyptus	1	"
Peppermint crystals	1	"
Wool fat	10	"

Melt the vaselin and wool fat over slow fire and then remove from the source of heat and mix the other ingredients with stirring. Continue stirring until the mass is almost solidified.

DIGESTIVE POWDER

Take equal parts of each of the following ingredients:—

Dry ginger, black pepper, piperlongum (pipul), caraway, ajwan, rock salt.

Reduce each ingredient to powder and then mix intimately.

Dose —½ teaspoonful after meals.

DEPILATORY SOAP

1988 G.C., Lahore—Wants to know a process of making depilatory soap.

Soap Base	2	seers.
White Starch	1	seer.
Barium Sulphide	2	seers.

Prepare soap base as usual and while in paste form incorporate the other two ingredients in fine powder. Mix intimately to have uniform mass and mould

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SHOE MAKERS' INK

2023 F.A., Gondia—Wishes to know a recipe of shoe makers' ink.

Nigrosin	6	oz.
Gall extract	40	"

Dissolve by vigorous shaking, and add to it the following solution:—

Ground shellac	2	oz.
Powdered borax	1	"
Water	12	"

Dissolve and strain.

To make gall extract take ½ lb. crushed galls; 2 oz. extract of logwood and water 40 oz. Boil together for half an hour, strain, and wash the strainer with water to produce 40 oz.

GLAZING BRICKS

2054 M.H.M., Amraoti—Desires to know a process of making glazing bricks.

An enamelled or glazed surface may be imparted to bricks by applying the following paint:—

Zinc oxide	46	parts.
Whiting	[illegible]	"
Water	[illegible]	"
Mix and add.		
Solution of sodium silicate	[illegible]	

Pass the mixture through a fine sieve previously adding a little ultramarine blue to remove any yellow tinge.

—BRIEF QUERIES AND REPLIES

Questions of any kind within the scope of Industry are invited. Enquiries or replies from our experts will be published free of charge in serial order. Questions are replied by post on receipt of As. 8 stamps for each question. Subscribers outside India are requested to send two International Reply coupons for each question. In order to facilitate the work of Editor's Department and to help prompt action the readers are requested to send enquiries in separate letters.

1 J. C., Adoni—Cutch may be had of Banshidhar Dutt, 126, Khengrapatty Street, Calcutta; Bahadurmall Catechu Factory, Champa, C. P. and Indian Wood Products Co. Ltd., 8, Netaji Subhas Road, Calcutta. Following is a formula of office gum :—Potato starch 7 oz., White dextrin 3 oz.; Sodium chloride 9 oz.; Zinc chloride 4 oz.; Water 1 gal.; Thyme oil 1 oz. Mix the starch and dextrin into uniform paste with a portion of cold water. Heat the remaining water to boiling, add salt and zinc chloride and gradually add starch mixture. Finally add the thyme oil.

3 G. S. M., Basti—You may start shoe lace, nib, penholder manufacture with Rs. 5.000/- as initial capital.

4 K. S. W., Ajmer—Reply to your letter has been sent by post.

6 D. S. M., Ernakulam—For dyes enquire of Champalal Agarwala, 45, Armenian Street and Fuzlehussein & Bros., 44, Armenian Street; both of Calcutta.

7 D. S., Kanpur—Following is a list of graphite dealers: Bengal Supply Co, 23-24. Strand Road, Calcutta; Modern Traders Ltd., 22. Canning Street and Keymer Bagshawe & Co. Ltd., 22, Strand Road; all of Calcutta.

8 D. N. P., Monghyr—You may consult Manufacture of Ink published from this office, price Rs. 3/7/- including postage. To make cement for fixing iron ring on glass mix up 1½ oz. of gum Sandarac, 1½ oz. of White shellac and ½ pint of methylated spirit.

9 B. N. D., Siwan—For cake papers you may write to Bengal Cardboard Industries & Printers Ltd., 165, Cornwallis Street, Calcutta.

10 M. G. M., Surat—Following is a formula of lemonade. To make lemonade add to 1 gallon of plain syrup, 2½ oz. of Citric acid, 1½ oz. of Essence of lemon and ½ oz. of salicylic acid. Both the citric and salicylic acids should be dissolved in water in glass or earthen vessels before being added to the syrup. All the ingredients should be added only when the syrup is cold. It is good if the essences and the colours are added just before the solutions are aerated under pressure of 100 lbs. and bottled up. Detailed information about aerated water manufacture will be found in Manufacture of Syrup and Cold Drinks, published from this office, price Rs. 3/7/- including postage.

11 A. B. M., Gujarkhan—Oil mill machineries may be had of Mirrlees Watson Co. Ltd., 28, Grosvenor House, 21, Old Court House Street, Calcutta.

12 J. D., Delhi—Titanium dioxide and triethanolamine may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane, Calcutta. Process of manufacturing hair dye and depilatory will be found in Prospective Industries published from this office, price Rs. 3/7/- including postage.

13 M. C. J., Agra—Process of manufacturing sodium silicate will be found in Chemical Industries of India; process of manufacturing boot polish and paints and varnishes will be found in Prospective Industries and process of manufacturing phenyle will be found in Manufacture of Disinfectants & Antiseptics. All the books are published from this office, price Rs. 3/7/- each.

14 A. B., Bangalore Cantt.—Following is a list of cycle dealers :—Bentinck Cycle Co. Ltd., 1-2, Chowringhee Road; Bimal Bros., 1-B, Chowringhee Road; H. D. Nundy & Co., 50-6, Dhurumtolla Street and N. D. Kundu & Co, 31, Dharamtola Street, all of Calcutta. Baby perambulators may be had of the above firms. Leather, rexine and plastic sheets may be had of A. C. Mohamed, A. C. House, P16. Bentinck Street, Calcutta.

16 N. F. A., Kalyan—For office equipment enquire of General Equipment Merchants Ltd., 9, Mission Row and Essco Ltd., P34, Mission Row, both of Calcutta.

27 J. C. P., Kanpur—You may apply metal polish for cleaning and polishing any kind of metal.

28 B. R. S., Patiala—A good formula of vanishing cream appeared in May 1948 issue of Industry.

39 W.W., Giridih—Process of manufacturing micanite will appear in formula section in an early issue of Industry.

39 B.P.J., Lashkar—Folowing is a list of casein dealers: Casein Trading Co., Anand; Chasma Plywood Products, 17, Phulbagan Road. Entally, Calcutta; Khaitan Sons & Co., 2, Dalhousie Square East, Calcutta and Law Murray & Co., 2, Cornwallis Street, Calcutta.

39 S. C., Kanpur—Formulas of tooth powder appeared in March 1950 issue of Industry.

42 M. S. K., Khilos—Following is the process of developing printed cloths. After printing, the cloth is left for drying and fixation for 24 hours and then the colours are developed for one minute in a sulphuric acid bath containing one part of concentrated sulphuric acid and 100 parts of water. This developing process is carried out in a wooden tub. The cloths having been passed through the bath, the prints are to be washed thoroughly in order to remove the gummy solution perfectly and then soaped hot, soap being dissolved in hot water. The prints are then dried and calendered whereby the goods receive a glazing and shining appearance.

43 G. S. K., Amritsar—Refer your query to Calcutta Engineering College, 13, Jamir Lane, Ballygunge, Calcutta.

44 R. P. V. C., Ludhiana—Addresses of commercial associations and magazines will be found in Industry Year Book & Directory published from this office, price Rs. 16/4/- including postage.

45 A. L., Bombay—You may refer your query to the Registration Department, Poona City.

46 P. C. G., Bulandshahr—A good formula of blood purifying powder appeared in February 1949 issue of Industry. For prescription of blood purifier according to Unani system you better consult a Unani book.

47 P. C., Bulandshahr—Process of block making will be found in Independent Careers for the Young published from this Office, price Rs. 3/7/- including postage.

48 M. W. C., Barmer—In silvering mirrors two solutions are required namely reducing solution and silvering solution: Dissolve 1 oz. of silver nitrate in 10 oz. of distilled water, then add liquid ammonia until the brown precipitate is nearly, but not quite, all dissolved, then add 1 oz. of alcohol and sufficient water to make 12 oz.. This is silvering solution. To prepare reducing solution in 1 oz. of distilled water dissolve 12 gr. of rochelle salts and boil; while boiling add 16 gr. of silver nitrate dissolved in 1 oz. of distilled water and continue boiling for 10 minutes more; then add more distilled water to make 12 oz. To silver take equal parts of two solutions and mix thoroughly and lay the glass face down, on the top of the mixture while well after it has been carefully cleaned with soda and well washed with clean water. About 2 dr. of each will silver a plate 2 inches square. The dish in which the silvering is done should be only a little larger than the plate. The solution should stand and settle for 2 or 3 days before being used and will keep good for a long time.

49 G. L. N., Tirunelveli—Refer your query to Nestle's Products (India) Ltd., 7, Hare St., Calcutta.

52 B. K. D. G., New Delhi—For preserving potatoes put in cinder or lime powder.

53 S. B., Cochin—Following is a formula of French polish:—Shellac 30 parts; Gum copal 15 parts; Gum arabic 7 parts; Methylated spirit 700 parts; Vermilion 5 parts. First of all pulverise the shellac, copal and gum arabic and then put into the spirit. Keep aside for 4 or 5 days stirring once a day. When dissolved strain through a cloth and keep in a well stoppered bottle.

54 J. N. W., Saharanpur—Carbide may be had of K. C. Dey & Sons, 161/1, Harrison Road, and Shaw Wallace & Co., Bankshall Street; both of Calcutta.

55 R. K. A., Vrindaban—Directory of Japan is not available at present.

56 M. L. K., Roorkee—For simrak enquire of Royal Perfumery Co., Main Street, Kanauj City and Debi Prasad Chandrika Prasad, Kanauj City. For learning boot polish you may negotiate with P. C. Bhattacharjee, 16/1, Nandalal Bose Lane, Calcutta 3.

57 N. N. D., Karnamadhu—Process of manufacturing Kimam and Zarda will be found in India Tobacco and Its Preparations published from this office, price Rs. 3/7/- including postage. For newar and lampwick making machine enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. Following is a formula of Tansen pills:—Liquorice 1 oz.; refined sugar ½ oz.; menthol crystals 5 gr.; otto of rose according to taste and essence of musk q.s. Grind liquorice into fine powder then mix it with sugar and finally add menthol and make into small pills. Otto of rose and essence of musk are to be taken in suitable quantities.

59 C. N. M., Tirur—Following is a process of making scented nuts:—Pulverise several betelnuts. Then mix with sufficient quantity of glycerine so as to moisten the powder. Next add a little pink colour which should of course, be harmless. Lastly add a small amount of

menthol, eucalyptus oil, etc., to perfume the substance as delicately as possible.

60 D. C. M. C., Delhi—Advertising tape and woven label making plants are not available. You may however enquire of W. H. Brady & Co. Ltd., Mercantile Bldgs., Lall Bazar, Calcutta. For plastic sheets enquire of Hindusthan Plastics Ltd., 109, Parsi Bazar Street, Bombay and Plastic Moulders Ltd., 38, Netaji Subhas Road, Calcutta. Plastic moulding machines may be had of Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta.

61 B. G., Raipur—Cardboard boxes may be had of Bengal Cardboard Industries & Printers Ltd., 165, Cornwallis Street and S. Antool & Co. Ltd., 91, Upper Circular Road; both of Calcutta. For blocks and labels enquire of N. Dev & Co., 1, Bhim Ghose Bye Lane, Calcutta. Bottles may be had of Radha Bazar Bottle Stores, 15, Radha Bazar Lane and Satya Charan Paul, 194, Old China Bazar Street; both of Calcutta.

73 S. D. S. P., Amritsar—You may refer your query to the Deputy Registrar of Trade Marks, 17, Prinsep Street, Calcutta.

74 H. R., Amritsar—One pinch means as much as you can hold with the tips of a finger and the thumb. Folding stove is not available in the market at present.

75 T. T., Pilibhit—Process of hydrogenating groundnut oil will be found in Vegetable Oil Industry published from this office, price Rs. 3/7/- including postage.

76 S. B. S. S., Ludhiana—For rice huller if required description enquire of Marshall Sons & Co. (India) Ltd., 99, Netaji Subhas Road, Calcutta.

77 M.C.C., Bombay—For jute heald cord enquire of Belting Co., 30/1 Netaji Subhas Road; Delta Engineering & Mill Stores Co. 21 Lansdowne Terrace; Ganguli & Co., 79 Netaji Subhas Road and Mill Stores Engineering Co., 12, Strand Road all of Calcutta.

78 E. M. N. T., Bombay—Electroplating of small articles is done by dipping process. In this connection you may consult Electroplating in Practice published from this office, price Rs. 3/7/- including postage. We have no book on manufacturing articles from tin and galvanised iron sheets.

79 S. E. K. H. S., Colombo—An article on Cattle Food Manufacture appeared in February 1950 issue of Industry. You may consult Manures and Their Application published from this office price Rs. 2/7/- including postage.

80 F.I.T.C., Chilakalapudi—Process of depositing gold by mercury amalgam process will be found in Electroplating in Practice published from this office, price Rs. 3/7/- including postage.

81 P.S.F., Hazaribagh—Reply to your letter has been sent by post.

82 B.L.B. Calcutta—Process of manufacturing soap will be found in Manufacture of Soap published from this office, price Rs. 3/7/- including postage.

83 J.M.S., Saharanpur—You may negotiate with the following photographers: Commercial Photo Co., 37, Ruxton Crescent, Cheam, Surrey; London S.W.1. and Fine Art Engravers Ltd., 1, Chemistar Garden Studios, Kensington, London 8.

84 G.S., Lucknow—We have no book dealing with Manufacture of Gold Buttons.

85 J.R.D.S., Delhi—For picture post cards enquire of Calcutta Commercial Bureau, Kalighat, Calcutta and Deen Brothers, Aligarh.

86 R.E., Goa—Process of manufacturing macaroni, coffee and preserved mangoes and other fruits will appear in formula section in an early issue of Industry.

89 R.S., Bulandshahr—You should secure shell grit, bone meal and fish metal locally. There is no market for above things.

94 H.K.S., Achipur—Candle making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta. An article on candle manufacture appeared in May, 1949, issue of Industry.

95 S.H., Madras—You perhaps require formula of lustre polish. Following is a formula of lustre polish:—Tallow 1 lb.; red oxide 2½ oz.; rotten stone 2 oz. Mix the oxide and rotten stone. Then melt the tallow and incorporate the other materials. Remove from heat but continue stirring for a few minutes more. Then pour into moulds.

96 S. V. R., Tatanagar — For knitting machine enquire of A. N. Saval & Co., 8B, Lall Bazar Street, Calcutta and W. H. Brady & Co. Ltd., Mercantile Building, Lall Bazar, Calcutta. May, 1947, issue of Industry is not available.

97 A.G., Bombay—Process of coir making will be found in Utilisation of Common Products published from this office, price Rs. 3/7/- including postage.

98 B.S.S., Delhi—Aerated water making machines may be had of Essence and Bottle Supply Agency, 14, Radha Bazar Street and Andrew Yule & Co. Ltd., 8, Clive Row, Calcutta.

99 G.D., Jubbulpore—Formulas of vanishing cream, cold cream, etc., will be found in Manufacture of Toilet Goods published from this office, price Rs 4/8/- including postage.

105 K.L.M., Mathura—Plastic goods making machines may be had of Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta.

106 L.S.R., Balasore—An article on soap manufacture appears elsewhere in this issue.

114 M.R.R., Tirupattur—For metal enquire of Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road; Chunilal Hemraj, 70, Netaji Subhas Road; Gopal Chandra Das & Co. Ltd., 24, Raja Woodmount Street and Jagannath Prosad Shree Nath, 93, Lower Chitpur Road; all of Calcutta.

115 N.S.R., Peddapuram—Water colour for process block appears elsewhere in this issue.

116 B., Calcutta—After making plastic articles you have to apply luminous paint to them.

It is not possible to manufacture plastic articles which will glow.

117 C.T., Indore—Address of Bengal Hosiery Manufacturers' Association is 20, Beadon Street, Calcutta. Following is a list of hosiery manufacturers:—D. N. Bose's Hosiery Factory, 26-1A, Sarkar Lane; Kalighat Hosiery Factory, 231, Rash Behari Avenue; Kapoor Hosiery Mills Ltd., 8, South Sinthee Road, and N. Bose's Beliaghata Hosiery Ltd., 1, Canal East Bye Lane; all of Calcutta.

118 M.C.A.M., Cannanore — For Chinese blue enquire of B. K. Sen, 39, Netaji Subhas Rd.; Chandi Charan Nayak, 124-1, Bow Bazar Street and G. C. Laha, 2, Dharamtola Street; all of Calcutta.

119 S.J.S., Mangalore—An article on ink manufacture appears elsewhere in this issue. An article on toilet goods manufacture also appears elsewhere in this issue.

120 P.L.J., Sonepet—As far as we know photo cameras are not manufactured in India at present. Process of grinding lens will appear in formula section in an early issue of Industry. You may however enquire of Shevade's Camera Works Ltd., Belgaum, Bombay Presy., and Welling Camera Works, Belgaum, Bombay Presy.,

121 H.L.H.S., Kapurthala—For chrome iron ore enquire of Calcutta Mineral Supply Co. Ltd., 31, Jackson Lane, Calcutta

123 I.D.T.A., Hyderabad—For tower bolts you may enquire of P. M. Shah & Co., Thangadh, Kathiawar.

126 N.T., Guntur—An article on artificial gem manufacture will be found in March, 1950, issue of Industry.

127 S.S.D., Delhi - For celluloid sheets of required description enquire of F. A. Hughes & Co. Ltd., Abbey House, Baker Street, London N. W. I., and Scott Bader & Co. Ltd., 109, Kingsway, London W.C.I.

128 I.D.T.A., Hyderabad - For tower bolts acetate and other solvents enquire of Calcutta Chemical Co. Ltd., 10 Bonfield Lane, Calcutta. For machine write to Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta. Dry paint is manufactured by Lakshmi Paint Works, 14/2, Old China Bazar Street, Calcutta and Murarka Paint & Varnish Works Ltd., 4E, Dalhousie Square, Calcutta.

130 A.S., Bulandshahr—Following is a list of business magazines:—Bombay Market, 21, Dadyseth Agiary Lane, Bombay; Business Friend, Parsi Bazar Street, Fort, Bombay and Commerce, Royal Insurance Bldgs., Churchgate St., Fort, Bombay. Following is a list of advertisement agents:—L. A. Stronach & Co. (India), Ltd., Wavel House, Graham Rd., Ballard Estate, Bombay and India Advertising Service, Shree Bhavan, 289, Sandhurst Road, Bombay.

131 D.S., Goalpara—Wants to be put in touch with the suppliers of picture transferring soap.

132 A.B., Lucknow—Following is a formula of hair dye:—Pyrogallic acid 20 grm.: Pyroligneous acid 250 grms.; Alcohol 650 grms.; Eaude Cologne 100 grms. Mix.

133 R.K.C., Ahmedabad—Feather, beeswax and gum are exported to England and America. Soap is exported to Burma. Ceylon and straits Settlements. You have to obtain Export License for exporting above things.

134 R.K.J., Kanpur—Formula of luminous paint will be found in February 1950 issue of Industry.

135 N.K.D., Calcutta—Process of manufacturing hookah tobacco will be found in Indian Tobacco and Its Preparations published from this office, price Rs. 3/7/- including postage.

136 S.S., New Delhi—For cementing glass to metal you may try the following formula:—Powdered flint 62 oz.; Sodium silicate 14 oz.; Water 14 oz.; Aluminium fluoride 10 oz. Mix and use. For graduation of glass you may use hydrofluoric acid. For an expert you should advertise in newspapers. For glass tubes enquire of Scientific Indian Glass Co. Ltd., 6, Church Lane, Calcutta.

137 D.C.N., Kaithal—Following is a list of mica merchants:—Premier Mica Mining & Mfg. Co., 32, Gopi Kristo Pal Lane and Calcutta Mica Corporation, 161 Muktaram Babu Street; both of Calcutta. A list of technical insitutions will be found in Industry Year Book and Directory published from this, office, price Rs. 16/4/- including postage.

138 P.K.S., Pachora—We have no book on chemical analysis. You may consult Vegetable Oil Industry published from this office, price Rs. 3/7/- including postage.

139 A.C.W., Delhi—For rubber extruding machine you may enquire of Francis Klein & Co Ltd., 1, Royal Exchange Place, Calcutta.

140 G.P.K., Krishna—An article on soap manufacture appears elsewhere in this issue. As regards local market you should study local demand of soap and its local production.

141 N.L.B., Chhotojagulia—You better consult Agricultural Department of W. B. Government. As regards use of tractor you should try to convince the local cultivators of the utility of tractors. If you cannot use tractor on hire system it will be great loss to you.

142 V.S., Salem—Process of manufacturing chewing tobacco will appear in formula section in due course.

143 T.S.R., Palni—For tobacco flavour enquire of Ghose Bros., 50, Ezra Street, Calcutta and F. N. Sarkar, 37, Canning Street, Calcutta

144 G.C., Baroda—Plastic powder may be had of Imperial Chemical Industries (India) Ltd., 18, Strand Road, Calcutta. You may consult Plastic Industry published from this office

164 R.D.S., Khallikota—For bone crushing machine enquire of Marshall Sons & Co. Ltd. 99, Netaji Subhas Road, Calcutta. Agar-agar is a gelatinous substance prepared in Japan from different species of Gelidium, plants belonging to the N. O. Rhodophycea. A similar substance is prepared in Macassar from species of Gracilaria. There is no Agar-agar factory in India or Pakistan For selling tool handles you may advertise in Industry.

165 M.L.R., Khurda Road—Biscuit making machine may be had of Small Machineries Mfg Co., 22, R G. Kar Road Calcutta. Process of biscuit manufacturing will be found in Home Industries published from this office, price Rs. 3/7/- including postage.

166 A V S R R.R.B., Waltair—Common salt is sodium chloride.

167 S K G, Waltair—Menthol may be prepared by chilling peppermint oil. For this purpose put a quantity of peppermint oil in a glass vessel and then surround it completely with freezing mixture of salt and ice. As the temperature of the oil diminishes crystals of peppermint collect at the bottom of the vessel These are then taken out, pressed in folds of blotting paper and kept in airtight bottles. Process of manufacturing camphor appeared in November, 1948, issue of Industry.

168 A N, Kuhuri — Refer your query to Adair Dutt & Co Ltd., Stephen House, 4, Dalhousie Square, Calcutta

169 A H.I, Dehra Dun—For movie picture projectors enquire of Eastern Electric & Engineering Co, 127 Mahatma Gandhi Road, Fort, Bombay 1 and Liberty Engineering Works, Calcutta Gate, Jamna Bazar, Delhi.

170 B G M, Borivli—Process of manufacturing toffee and chocolate will be found in Manufacture of Confectionery published from this office, price Rs 3/7/- including postage.

171 M I, Lucknow—Process of manufacturing solid phenyle appears elsewhere in this issue.

172 D D., Hyderabad—Cardboard boxes may be had of S Antool & Co Ltd. 91, Upper Circular Road, Calcutta: Bengal Cardboard Industries & Printers Ltd, 165, Cornwallis Street Calcutta, Central Paper Box Factory, Patel Bldg., 250, Nagdevi Street, Bombay and Gogate Paper Box Works, Princess Street, Bombay.

173 J.M.J., Pathankot — You may start manufacture of rubber balloons, nipples, dropper, etc. For these industries you may invest very small sum. Processes will be found in Manufacture of Rubber Goods published from this office, price Rs. 3/7/- including postage.

174 R.D.S., Kallikota—Can supply Gracilaria sea weeds.

183 R.S., Meerut City—Following is a formula of sewing machine oil:—Rope oil 10 parts; Alcohol 90 p.c. 5 parts. Mix the oil with alcohol and heat the mixture on a water bath until the alcohol begins to boil, the whole being kept stirred When boiling of the spirit sets in put out the fire and pour the liquid into a large flask of clear glass and expose to sun light until thoroughly bleached. For green dye enquire of Champalal Agarwala. 45, Armenian Street, Calcutta.

184 P J N, Delhi—Plastic powder may be had of Imperial Chemical Industries (India) Ltd 18, Strand Road, Calcutta. You may consult Plastic Industry published from this office. Plastic press etc, may be had of Francis Klein & Co Ltd. 1, Royal Exchange Place, Calcutta.

187 O M E W., Lashkar—An article on colouring aluminium appeared in February, 1949, issue of Industry.

188 V K P, Tirunelodi Town—Following is the process of manufacturing table salt:—To prepare table salt dissolve lump salt in four times its weight of distilled water, filter and then drop into the filtered solution first a chloride of barium and afterwards carbonate of soda as long as any precipitate falls Then filter and evaporate the clear fluid very slowly until crystals begin to appear When this condition reached set aside the solution for a day The crystals are taken out, dried and kept in bottles.

191 I R S, Nellore—Process of manufacturing fountain pens will be found in Mechanical Industries published from this office price Rs 3/7/ including postage You may start fountain pen manufacture with 20,000/- on home industry basis

192 H R, Agra—You may use eucalyptus oil and oil pennyroyal to any powder

194 J S M, Surat—Following is a list of cloth merchants of Madras:—Chimanlal M. Modi, Jadamuni Koil Street: Hajee Karim Hajee Abraham Devraj Mudali Street; Kothari Textiles Ltd, Oriental Bldgs Armenian Street and S M Meera Sahib & Co., 284, Linga Chetty Street.

195 T S P., Bombay — Following is a formula of gold colouring tins:—Shellac 5 oz.:

Turmeric 2 oz.; Gamboge 2 oz.: Dragon's blood 4 dr.; Methylated spirit 3 pints. Dissolve the ingredients in methylated spirit and apply the lacquer on tin articles which should be thoroughly cleaned with soft soap and hot water and warmed.

197 R.C., Raikot - For oil mill, dall mill and flour mill machines enquire of Mirrlees Watson & Co Ltd., Grosvenor House, 21, Old Court House Street; Marshall Sons & Co., Ltd., 99, Netaji Subhas Road and Balmer Lawrie & Co., Ltd., 103, Netaji Subhas Road; all of Calcutta.

199 V S W, Kakinada--Questions are replied by post on receipt of 8 annas stamp for each question

201 A V K S, Vijayawada—Process of manufacturing rubber teats and balloons will be found in Manufacture of Rubber Goods published from this office, price Rs 3 7 including postage.

204 S V, Lucknow - Formulas of solid phenyle marking ink, etc., appear in this issue. Other formulas you require will appear in due course.

206 J S B, Narnaul—Your query is not in our line.

207 P C I, Travancore—Following is a formula of tambool tablets:—Take one tola each of powdered betelnut, coriander seed, aniseed, parsley, nutmeg, ajowan, saffron, seeds of cardamom major, seeds of cardamom minor, cloves, dry rose petals Soak them in good rose water for 12 hours Then bray them together to a paste form, incorporate chua and camphor and press into tablets.

208 M K G., Muzaffarpur—For thread ball making machine enquire of W. H. Brady & Co., Ltd., Mercantile Bldg., Lall Bazar, Calcutta and Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta.

210 B V B, Bombay—We have no book on paint and distemper manufacture. You may however enquire of Thacker Spink & Co. (1933), Ltd., 3, Esplanade East, Calcutta.

212 S V., Lucknow—Cooling of water is done in a refrigerator The refrigerator generally consists of a series of tubes, through the metal of which the heat abstracted from the substance being cooled is conducted to the medium which flows through them, allowing the liquid refrigerant to vaporise and by this action constituting the refrigerating effect of the machine. As a rule the refrigerant before rises on the inside of the tubes in the refrigerator the medium to be cooled being on the outside.

213 D.D.L., Bangalore City—You may consult Cotton Dyeing & Printing published from this office, price Rs. 3/7/- including postage.

216 S.L.K., Jullundur—For manufacturing crayon of different colour you may use different pigment colour.

218 G.K., Bhopal—To communicate with any querist write him with number and initials Care of Industry when your letter will be duly redirected.

220 C D, Raipur—For candles enquire of Dipak Candle Mfg. Co., 375, Upper Chitpur Road; Rupali Candle Works, 9, Mondal Street and United Manufacturers & Traders, 7, Hans Pooker Lane; all of Calcutta.

221 O.P.K., Simla—You may start bee-keeping at Simla. You may enquire of All India Bee Keepers' Association, Jeolikote, Nainital. Colours may be had of Champalal Agarwala, 45, Armenian Street, Calcutta. You may start a dairy farm at your place with Rs. 10,000/- on a small scale.

224 A.S.N., Sahapur—Homeopathic medicines may be had of C. Ringer & Co., Norton Bldgs., Lallbazar, Calcutta; Regular Homeo Pharmacy, 67, Netaji Subhas Road, Calcutta and M. Bhattacharyya & Co., 84, Netaji Subhas Road, Calcutta.

228 L P., Colombo—Following is a recipe of curry powder: Coriander seed 48 parts; Ginger 3 parts; Turmeric 24 parts; Cinnamon 16 parts; Cumin seeds 8 parts; Fenugreek seed 4 parts; Cayenne-pepper 3 parts; Pimento 2 parts; Black pepper 1 part; Long pepper 1 part; cloves 1 part; nutmeg 1 part. Reduce the ingredients into fine powder and mix thoroughly.

229 A.S., Kanpur—For gramophone meters enquire of C. C. Saha Ltd., 170, Dharamtala St.; N. B. Sen & Bros., 11, Esplanade East and Mullick Bros., 182, Dharamtala Street; all of Calcutta.

230 I.S., Tngul—For yarn bundling and squeezing machine enquire of W. H. Brady & Co. Ltd., Mercantile Bldgs., Lall Bazar and Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension; both of Calcutta.

231 B.L.S., Manipur—For cementing two sheets of glass you may use Canada balsam.

233 S.A.N., Ambasamudram—Glass sheets are coloured in course of manufacture. For matches enquire of Calcutta Match Industrial Works, 14-C, Canal East Road, Calcutta; Esavi India Match Mfg. Co., 67, Murari Pukur Road, Calcutta; Ambarnath Match Factory, Ambarnath, Thana and Bombay Match Works, New Agra Road, Bombay. For hydrofluoric acid enquire of Calcutta Chemical Co. Ltd., 10, Bonfield Lane, Calcutta. For laundry plant enquire of Jesson & Co., 93, Netaji Subhas Road, Calcutta. You may draw flowers on glass sheets with lacquer.

236 A.R., Quetta — For illustrated catalogues of ornaments you may write to M. B. Sirkar & Son, 124, Bowbazar Street; B. Sirkar & Sons, Ltd., 131, Bowbazar Street and Chandra & Sons Ltd., 116-1, Bowbazar Street; all of Calcutta.

REVIEW OF BOOKS

PRESENT ECONOMIC SITUATION by J. C. Kumarappa. Published by The All-India Village Industries Association, Maganvadi, Wardha, C.P. Pages, 151, price, Rs. 2/-.

A collection of a number of articles by the author which had previously appeared in the "Gram Udyog Patrika", this book claims to be a study of India's economic problems from the Gandhian point of view.

Dealing with this country's economic situation in general, the author stresses the need for doing first things first. These, according to him, include food, clothing and shelter. He regrets that at present the economic machinery takes no cognisance of moral values. He complains that it is not calculated to ameliorate the sufferings of the masses.

As a cure for the chronic evil of our food scarcity and famine, Mr. Kumarappa makes the following points:—(1) All emphasis should rest on the cultivation of food crops rather than on commercial crops; (2) Food products should not be allowed to be converted into non-food articles, like milk into casein, wheat and rice into starch and so on; (3) The military personnel should be put on the job of helping the country to produce more food; (4) A campaign for afforestation is necessary in the interest of our agriculture.

Mr. Kumarappa has plenty of faith in this country's traditional method of cultivation. He is dead against the adoption of western methods. Mechanization of agriculture and the reckless use of chemical fertilizers are considered by him as definitely harmful to the fertility of the soil as well as the health of the consumers. In industry he stands against centralization and urges development of our numerous cottage industries.

The modern reader will fail to see eye to eye with Mr. Kumarappa. But despite that disagreement with the author, the book seems well worth reading for no other reason than most of its views and ideas are thought-provoking and even a sort of challenge to the so-called modernism of our planners.

THE NEW CONGRESS by Shankarrao Deo. Published by All-India Congress Committee, 7, Jantar Mantar Road, New Delhi. Pages, 56, price, Re. 1/-.

In the pre-transfer of power period the Congress was a joint front of all anti-imperialist elements wedded to the task of attainment of India's national freedom. This task has now been completed and the new Congress that has been born in the age of independence cannot afford to continue any more as a loose confederation of a large number of political parties and groups. The common bond which once held them together has now been snapped and in the changed circumstances of to-day the Congress has to convert itself into a well-disciplined political party.

Mr. Deo explains in this pamphlet what the task of the new Congress shoud be and what precisely are the duties and responsibilities of its members. The objective of the new Congress is now enlarged into "the well-being and advancement of the people of India and the establishment in India by peaceful and legitimate means of a Co-operative Commonwealth based on equality of opportunity and of political, economic and social rights and aiming at world peace and fellowship." Mr. Deo outlines in his pamphlet how this aim can be realised and being a follower of Mahatma Gandhi he stresses the need for a correlation of means with ends and for keeping both at the same level of purity. The over-all emphasis is on painstaking constructive efforts and activities in the socio-economic sphere for the purpose of converting our political freedom into an instrument of well-being for the people.

BHARATER PANNYA (INDIA'S MERCHANDISE) by Kali Charan Ghose. Published by Bindubasini Bani Mandir, 6, Raja Basanta Roy Road, Kalighat, Calcutta 26. Pages, 178, price, Rs. 2/4/-.

This is a very useful and informative book on India's merchandise, in particular the fibres that have entered into our foreign trade. The book came out for the first time about ten years ago and in the present edition it has been thoroughly revised and made up-to-date.

The book gives all necessary details about jute, cotton, wool, silk, sann hemp and a number of other fibres which are grown in India and which have already estabished their reputation in the world market. Besides making a study of the raw materials position the book reviews two of our principal modern industries, viz., jute and cotton textiles. With regard to the first we have to face two major handicaps which are our dependence on

Pakistan for raw jute and secondly, competition from substitutes already in vogue in the countries that used to buy our jute manufactures in large quantities. Already commendable efforts are being made in India to grow her own requirements of raw jute and as for the other difficulty, the author advises scientific research on jute and the possibilities of its admixture with other materials with a view to lowering the cost of production of jute goods.

India's cotton textile industry is yet to come into its own. At present, shortage of raw cotton is beginning to be felt. The number of mills now in existence cannot produce all our requirements of cloth. The opening of more mills is, therefore, necessary. The author also draws attention to the competition to our silk industry offered by artificial silk. Even though artificial silk is no silk, it is very cheap and that is the main reason why consumers prefer its false gloss to the genuine loveliness and durability of real silk.

Special mention is made of India's cottage industries like silk and cotton textiles. Not only are their products of the very finest quality but they are important to the rural folk as a subsidiary occupation in seasons when they do not engage in agricultural activities.

MINIMUM WAGE FIXING MACHINERY IN AGRICULTURE. Published by International Labour Office, Geneva.

In recent years wage regulation in agriculture is being resorted to in various countries. This is being done mainly through collected bargaining between agricultural employers and workers' organisations, with or without State assistance. In some countries minimum wages are fixed by statute or by State machinery. Referring to India this Report says that a Minimum Wages Act was enacted in 1948 extending to all the Provinces. The Act is not to apply in Provinces where there are less than a thousand workers in a particular trade. The Report points out that, when after World War I collective bargaining and minimum wage fixing machinery were introduced simultaneously into agriculture, the great majority of the agricultural unions declared their choice for collective bargaining. But collective bargaining alone cannot ensure the maintenance of a certain wage level for workers. State intervention and suitable legislation are needed for the purpose.

Low wages are bad not only for workers, they cannot fail to react unfavourably on the level of efficiency and production in agriculture, and also in other spheres of economy. The report shows that the objective of minimum wage regulation is not only to maintain certain levels of wages and to protect the conditions of employment of certain categories of workers, but also to help in the promotion of certain social and economic conditions that will turn agriculture into a remunerative occupation, and thus lay the foundations of higher standards of living for all those engaged in the industry.

NOTICES & REVIEWS

(Manufacturers sending specimens and samples of their products for notice and review may please note that no notice is published of medical preparation and allied substances in this section.)

CELLULOSE CAPSULES

We have the pleasure to receive 2 samples of elastic capsules manufactured by Cellulose Products Co., Aminjikarai P.O., Madras 10. The products comprise different varieties such as white opaque, white transparent, red transparent, etc. There are different sizes to fit big bottles, pints, small phials etc. These are all intended for capping, medicinal, toilet and other phials.

METAL LABELS

We are glad to receive a few samples of metal labels from Excel Process Works, Delisle Road, Bombay 13. These labels are artistically made of brass and are very suitable for machinery, motors, furniture, fans, radios, safes, etc. We wish the concern every success.

FIREPROOF PHOTO MINIATURES

We have the pleasure to receive from Kateja Sonamarts Fireproof Photo Products, Ganga Mataji, Gopalji Road, Jaipur City, Rajasthan, a few samples of fireproof photo lockets very suitable for decoration of ornaments and other presentation articles. The make-up and finish of these products is excellent.

CALENDARS.

We are glad to acknowledge receipt of calendars from the following :—

Research Chemical Works, Ezra Mansions, 10, Government Place East, Calcutta ; Excel Process Works, Madha Bhuvan, Delisle Road, Bombay 13 ; and Brilliant Match Works, Post Box No. 35, Sivakasi.

TRADE ENQUIRIES

(To communicate with any party write to him direct with name and address given below mentioning Industry).

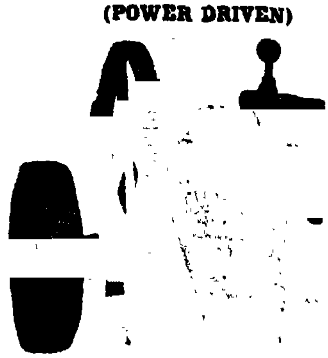
3867 G.V. Rane, C/o. Bas Co., Cross Cut Road, Coimbatore—Wants to be put in touch with the suppliers of whistles for whistling toys.

3875 Gopal Das Seth & Co., 14/18, Civil Lines, Kanpur—Want to be put in touch with the manufacturers of handloom cloth in South India.

3885 B. Lalchand, 28, Pusa Market, New Delhi—Wants to be put in touch with the manufacturers of rouges of cakes and paste.

2 The Fine Watch House, 7B, Ranjit Singh Road, New Delhi—Want to be put in touch with the manufacturers of buttons, hands and dials of timepieces, celluloid cases of pocket watches and chains for wrist and pocket watches in Delhi.

5 The English Book Depot, Agra, U. P.—Want to be put in touch with the suppliers of Plasticine in bulk.



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EDITORIAL CONTENTS FOR

MAY, 1958

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All enquiries regarding industrial or busi[ness] information should be addressed to the [Edi]tor. Contributions and articles for review [or no]tice should also be sent to him.

All enquiries regarding the Subscription or [Adve]rtisement Departments should be addressed [to the] General Manager.

OFFICE HOURS.

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Wanted Agents to Earn [illegible]/- Monthly [illegible] for Embossers, Numberplates, Locks & [illegible] machines Apply International Industries [illegible] Aligarh. 1[illegible] AA

[illegible] "Organisers and Agents" on suitable [illegible] Apply Oriental Provident Insurance [illegible] [illegible] Street, Calcutta. Phone Cal. [illegible] 154 AA

[illegible] Rs. [illegible]/- plus commission to suitable [illegible]. Apply Valley Tea Corporation, [illegible] Doctor Road, Calcutta—14. 1[illegible] AA

[illegible] agents or stockists for our [illegible] [illegible] Buttons on [illegible] Apply for terms and samples to: [illegible] Co. P. B. [illegible], Delhi. 71 AA

[illegible]

AGENTS WANTED

"Your letter heads on Linen [illegible] visiting cards [illegible] for Rs. [illegible] Gate Press. Delhi." [illegible]

On lucrative commission for [illegible] Corporation, 447, British Infantary [illegible] Ambala Cantt. 4[illegible]

Tanned Leather of all descriptions. W[illegible] Agents. East India Trading Company, [illegible] Box 487, Calcutta (India). [illegible]

Eighty years calendar. Plastic [illegible] Sample (Re 1/8/-) Rupee one & annas [illegible] only. Jasuja Brothers Partap [illegible] Amritsar. 47[illegible]

"Wanted Agents to secure orders on [illegible]mission basis for our art silk carpets [illegible] cotton carpets with attractive workmanship [illegible] suit the tastes of one and all Terms attractive. For details apply to. "Sundaram Carpet [illegible]tiles Bhavani P. O. S. India. 46[illegible]

Wanted Agents & [illegible] to [illegible] sale of "Metroscope" (A wonderful Stereo[illegible] device, ever invented in India. It [illegible] enlarged pictures in amazing realism of Third Dimension) in lucrative terms. Apply to [illegible] Bagchi & Co., 89/6, Ripon Street, Calcutta—[illegible] 48[illegible]

Wanted Agents & Wholesale Dealers [illegible] Berlin & Knitting Wools, Plain & Embroider[illegible]ed Shawls, Hosiery and Textile Goods [illegible] Contact with H. R. Luxman & Co., Amritsar. 27[illegible]

"Wanted — Agents and stockists for "Kisan" Radios. Minimum price Rs. 1[illegible] Under a new redemption scheme you may [illegible] a Radio even for Rs. 5. For full details apply to Kumar Ltd., Moradabad." 47[illegible]

Wanted:—Agents, Stockists for [illegible] buttons (gold-plated), 3 years guranteed. [illegible] attractive. Sample's. cost Rs. 15/-. Universal Traders. 1/1A, Subol Chandra [illegible] Calcutta—9 [illegible]

Wanted Agents & Stockists for "[illegible]" (Female Tabs.) Thousands of grateful users everywhere! Full details & Business terms on application. Mrs. P. Devee, F. D. S. (I) Tollygunge, Calcutta—33. [illegible]

Wanted:—Wholesale Dealers for our [illegible] make first class "Mullick" Brand [illegible] Treadle Sewing Machines. Thousands [illegible] already in actual use with reputation. [illegible] Mullick & Sons, Ltd., 77-13, Dharamtala [illegible] Calcutta. [illegible]

Wanted:—Agents and Stockists for [illegible] wonderful medicine "Salatine" a powerful remedy for constipation dyspepsia, acidity, indigestion and all sorts of stomach troubles. J. Smith & Co. P. O. Box No. 2309, Calcutta. 29 AA

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[illegible]

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... business relations with Indian Manufacturers and Exporters. Interested in all kinds of Indian products. Catalogues, samples and quotations, invited. Ready to act as local ... & Representatives. "Clerks" Stores, General Traders, P. O. Box 110, Accra, Gold Coast, West Africa. 475 AG

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... Bazar Bottles Stores, 15, Radha Bazar Lane, Calcutta 1. Bottles Phials, Cork Products, etc. Phone: Cal. 6794. Tele: "Korkbag." 111 BC

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... Bottle Stores, 13..., ... St., Calcutta. Dealers & Importers of empty Bottles, Phials, Homoeo Phials, Glasswares & ... of all description. 151 BC

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Bengal Herbs Stores, 2, Mullick Street, Calcutta, Hingul (Mercury Sulphur Compound) Murdasankha, Red Lead, Mercury, Belladona, Liquorious Root, Raowolfia Serpentina, Senega, Cinchona, Spices, etc. 296 CD

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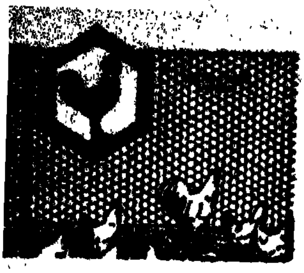
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EDITOR:

K. N. BANERJEE.

VOL. XLI. CALCUTTA, MAY, 1950 NO. 482.

REHABILITATION OF REFUGEES

THOUGH the immediate task ahead of us with regard to the refugees from East Pakistan is to provide relief to them, we would do well to realize from the very start that relief measures cannot continue permanently, nor can mere charity succeed in bringing any genuine succour to a vast mass of afflicted humanity.

Taking it for granted that most of these displaced persons will not be ready to go back to where they have come from we will have to take timely steps to absorb them in the economic life of the Indian Union. Concentration of an unweildy bulk of refugees in any one State will simply augment the pressure on its soil. Hence, perhaps, efforts are being made to disperse them over a number of States.

Once the refugees have been provided with a shelter and their shattered health recouped, the need will arise for making efforts to win them back to normalcy through work. Provided with work especially in developing agriculture, and medium and small industries, the refugees will effectively solve their own bread problem and also contribute to some extent towards increasing the output of India's national wealth. There are among them many fine cultivators and artisans who should be counted as potential wealth and not as an unwanted burden. The rest can be given training and thus enabled to shift for themselves.

In this connexion we are glad to be told that Authority is now studying some plans prepared by the officials of the relief and rehabilitation department, for training of displaced persons. The schemes concerned envisage the setting up of a number of production-cum-training centres either by Government or through co-operative organizations. It is said that initially three small industries only will come within the orbit of the schemes. These are book-binding, waste-silk spinning and tailoring.

The refugees can be accommodated in a number of satellite towns all over West Bengal in the building of which the Government should utilize their labour. Each of these towns given proper facilities, can be made to specialize in a particular trade or small industry.

CURRENT TOPICS

INDO-PAKISTAN TRADE

For some time past both India and Pakistan have been feeling the need to reopen trade between the two States, which virtually reached a stage of deadlock shortly after the devaluation of the Indian rupee and Pakistan's refusal to follow suit. There is now little doubt left in any sensible mind that political relations between the two countries can hardly improve to any perceptible extent without a simultaneous speedy restoration of the Indo-Pakistani trade. The economies of Bharat and Pakistan are inter-dependent and the suspension of normal trade relations between them are bound to affect both almost equally adversely. Take the two cases of cotton and jute. Due to disparity in the value of the two Rupees Indian millowners were forced to stop purchasing these raw materials from Pakistan. But as a result of the boycott, not only has Pakistan suffered considerable financial losses but India's dollar earning programme too has had a set-back.

The Government of India showed genuine statesmanship, therefore, by sending a message to the Pakistani Government as far back as February, that they would be prepared to have a conference for the purpose of discussing all pending trade questions comprehensively. According to a recent report appearing in *The Statesman*, Pakistan has accepted India's suggestion for a conference to resolve the trade deadlock. We are of the opinion that the problem cannot admit of any piecemeal solution. On the one hand there is the urgent need for a successful liquidation of the various political feuds between the two countries and on the other there should be a wider settlement of all the trade disputes, and not merely in respect of one or two items. Behind the present ennervating phenomenon of trade deadlock dragging the two States down into the jaws of bankruptcy, there is one paramount factor involved, namely, disparity between the two Rupees on account of India's devalution and Pakistan's non-devaluation. This root cause of the trade deadlock has got to be removed: the malady is too serious to be cured by any symptomatic treatment.

In the meanwhile, strong resentment has been caused in certain quarters by last month's efforts in Calcutta by officials of the Pakistan Jute Board and certain representatives of the I. J. M. A. to resolve the jute deadlock. But what has been erroneously described as the "Jute Deal" never went beyond the proposal stage and all concerned should know that negotiations to import 800,000 tons of raw jute from Pakistan on a barter basis could not materialize without the approval of the Government of India. And yet over this highly fictitious deal, a deal which was never thrashed out at all, MPs have been heard to use bitter invectives against the representatives of the jute industry whom the officials of the Pakistan Jute Board met to talk on jute in an informal manner. Newspapers which have started seeing the ghost everywhere rushed to the length of describing the infructuous jute deal as an instance of appeasement of Pakistan by India. Such criticisms can only betray a pathological state of mind and Pandit Nehru had to remind the M.P. who used abusive language against those who negotiated the "barter deal," that it was not right to use an expression like the "Bania" against "eminent citizens of this country." Com-

merce Minister, Mr. Neogy told the M.P. concerned that no consent of the Government was required for the purpose of carrying on informal talks between the jute industry and officers of the Pakistani Government who had been specially charged with the supply of jute from East Pakistan. Mr. Neogy has made it clear on behalf of the Indian Government that India would welcome a peaceful solution of all outstanding trade disputes between the two countries. Unhappily, however, the present atmosphere of suspicion and hatred prevailing in both Bengals seems hardly conducive to such a settlement. So long as the problem of the minorities in the two states remains unsolved, any well-intentioned endeavour to improve trade relations between them is very likely to be misunderstood as something it is never meant to be.

Speaking from the purely economic point of view, we are of the opinion that India stands to gain by waiting and by insisting upon a wider settlement of all the important trade issues in dispute, and not merely with regard to jute. The varieties of jute which Pakistan hoped to sell to India under the "Barter deal" were such as Indian Mills alone could buy. There is no doubt we need it if we want to maintain the dollar earning capacity of our jute industry. But since India is the only buyer of such jute, Pakistan's need to sell to us is very urgent. Hence, perhaps, we ought to do nothing in a huff.

WOES OF THE MIDDLE CLASS

Some time ago the Bengal Trades Association, meeting in Calcutta, drew the attention of the Government in a resolution to the miserable economic plight of the middle class and to the need for formulation of economic policies "with an eye to the interest of the middle class." Lower and higher income groups benefited from the war, but in the case of the middle class monetary income has undergone a very slight increase, while cost of living has shot up tremendously. This has hit the middle class very badly. Most middle class people have to spend all their earnings on food, clothing and shelter and there is scarcely any surplus left with them after meeting these essential expenses, which they could spend on other things. Unless the lot of the middle class is improved, the campaign of small saving which is bound to benefit industry, if properly utilized, cannot make any satisfactory progress.

The Bengal Trades Association has urged a speedy solution of the present difficulties of some of our banks. This can be done by amalgamation and by a change-over to new honest and efficient management in all cases where dishonesty is suspected. Due to failure of some of the banks to meet their demand liabilities many middle class depositors have been robbed overnight of their entire life's earnings. No complacent view can be taken of the present disturbing phenomenon of bank failures in Bengal. Banks have stopped payment either due to erroneous handling of business by their management or due to their unscrupulous activities with the motive of making fortune at other's expense. It is time that the Government were to decide to root out the evil and quarantine off the dishonest fortune-hunters and gamblers from any association with the management of public institutions like banks.

Most of the refugees from Pakistan now pouring into India belong to the middle class. With their arrival the total volume of the woes of the middle class has been augmented further. The Bengal Trades Association recommended a planned development of medium and small industries in order to provide employment

to the refugees and slowly and gradually win them back to normalcy.

BALANCED ECONOMY

Finance Minister, Dr. John Matthai told Parliament some time ago that what the country needed was not nationalization but a system of mixed economy. In a mixed economy there is room for both state and private enterprises and their balanced development is expected to bring about increased production of national wealth. As pointed out by Dr. Matthai, the central fact of the Government's industrial policy is that key and and basic industries only should be undertaken by the state, leaving the rest to private enterprise.

There is no doubt that private enterprise has got to play an important role in the national economic development of India and perhaps, out of an awareness of this tax reliefs and concessions have been given to private enterprise in this year's budget. The Government is banking upon the hope that our industrialists will appreciate this gesture and set about investing more money in their enterprises and thus key up the work of national economic development in a satisfactory manner. But even under a mixed economy the Government should not take too many things for granted, nor pin high hopes on the private entrepreneurs most of whom have been found wanting at a stage when the nation needed their services most. In a mixed economy, as we see it, there ought to be three sectors:—(1) A sector of exclusive state enterprises to be newly undertaken; (2) A sector of state enterprises to be created from among the existing private enterprises; and (3) a sector of exclusive private enterprises. Even though the third will be the largest sector, the state too will have to overcome its present diffidence and take over industrial development of the country on its own initiative. Mixed economy does not and should not end in unchartered freedom of activity being given to private enterprise. A judicious measure of state control of private enterprise is called for and this the Government should be prepared to enforce in the interest of national welfare.

Speaking on the role of foreign capital Dr. Matthai said that we needed foreign help in money, technical advice and in other directions for the purpose of working out India's economic salvation. He admitted that the U.S.A's. response to our appeal for assistance had not proved encouraging. As an alternative we shall have to depend more on the U. K. than on U.S.A. But even so, it should be borne in mind by all concerned that in carrying out the work of national economic development, we shall have to cease looking the London way or the Washington way and depend to a considerable extent on our own capacity and resources. In a sense this is better than entertaining the false delusion that foreigners will be only very glad to help us with money, men and equipment. If we learn to depend on ourselves and get going along the path of progress and stability, there may come a time when foreign technical and financial assistance will be available on more liberal terms than at present.

Dr. Matthai has also stressed the need for establishing a balanced economy. By this he means the need for balancing industries and agriculture on the one hand; and on the other, for working out a harmonious development of our big and small industries. India's economy is fundamentally rural in character; but in the present century we can hardly afford to bear a step-motherly attitude to the modern large-scale industries. The need to-day is to remove the artificial barrier

that continues to divide our two economies rural and urban. As for the rural industries, our aim must be to mechanize them as far as possible and an early implementation of the country's various hydro-electric schemes will render a great help in the matter. Much though the need for development of small industries, we should not be led to think that these alone are adequate to our needs. We have to build the large-scale and heavy industries too, if we want to promote prosperity by an increased production of the national wealth.

THE PLANNING COMMISSION

The much-awaited Planning Commission has at last been formed with Prime Minister, Pandit Nehru as its Chairman. The Cabinet Secretariat's resolution announcing the personnel of the Commission and its terms of reference: its objectives, etc., also gives a brief review of the efforts made in the past for planned development of the country. The first effort, though on a rather academic level, at planned development of national economy was made by the Congress-sponsored National Planning Committee. This organisation which is now defunct, was formed in 1938. Its work was interrupted by war, but the findings of the N. P. C. have been published in the form of reports edited by Prof. K. T. Shah who had been its General Secretary. The first official planning organization came into being when a separate department of planning and development was formed at the Centre with the late Sir Ardeshir Dalal as its Member-in-Charge. When the Interim Government was formed in 1946, an Advisory Planning Board was appointed. It was the recommendation of the A. P. B. that the Government should appoint a Planning Commission.

According to the terms of reference as set forth in the resolution of the Cabinet Secretariat, the Planning Commission will:—(1) "Make an assessment of the material, capital and human resources of the country, including technical personnel, and investigate the possibilities of augmenting such of those resources as are found to be deficient in relation to the nation's requirements.

(2) "Formulate a plan for the most effective and balanced utilisation of the country's resources;

(3) "On a determination of priorities, define the stages in which the plan should be carried out, and propose the allocation of resources for the due completion of each stage;

(4) "Indicate the factors which are tending to retard economic development and determine the conditions which, in view of the current social and political situation, should be established for the successful execution of the plan;

(5) "Determine the nature of the machinery which will be necessary for securing the successful implementation of each stage of the plan in all its aspects;

(6) "Appraise from time to time the progress achieved in the execution of each stage of the plan and recommend the adjustments of policy and measures, that such appraisal may show to be necessary; and

(7) "Make such interim or ancilliary recommendations as appear to it to be appropriate either for facilitating the discharge of the duties assigned to it; or on a consideration of the prevailing economic conditions, current policies, measures and development programmes; or on an examination of such specific problems as may be referred to it for advice by Central or State Governments."

It is abundantly clear to all that the Planning Commission, strictly speaking,

is only an advisory body. Though its recommendations may not be ignored, the ultimate responsibility for accepting them in their original or modified form and for implementing them, will rest with the Cabinet. Even so, the Commission will serve a very useful purpose if it can do full justice to the objectives with which it has been formed.

It is noteworthy that the Cabinet Secretariat's resolution stresses the need of co-operation from both Capital and Labour in the task of planned national development. Such co-operation is essential if we are to overcome the feeling that planned development is something in the nature of "a super-imposition by a powerful authority from above." Speaking at the annual session of the Federation of Indian Chambers of Commerce two months ago, Pandit Nehru also stressed the same point when he said, "One of the main things the Commission has to do, according to my thinking, is to consider how to bring in the co-operation of large masses of people in our great national undertakings."

From the terms of reference quoted above it is not possible to guess how exactly the task of national economic development is to be tackled. But if one could depend upon what some of our Ministers are saying about decentralization and the development of small and cottage industries, one would be justified in expecting that these will receive priority of attention, at least for the time being when due to paucity of machinery and the requisite technical personnel we can hardly think of undertaking the more ambitious work of building heavy and large-scale industries in our country.

—Soap Making by Full-Boiled Process

THIS process of soap making requires a considerable amount of experience and skill. The proper manufacture of a soap by this process can only be achieved by long constant practice.

The full-boiled process is carried on by a series of operations. It is possible to make a full-boiled soap by as few as two of these changes, namely the strong change and fit for finish. Strong changes refer to the operation of completely sapo-saponifying the fat or oil and graining and washing with lye. The objection to carrying on this method by two operations is that it cannot be universally employed owing to the complications which arise in using up the partly-spent lye which is produced by the strong change. It is possible, however, to make a full-boiled soap which is satisfactory from all angles by using only three operations namely (1) a partial saponification or killing change with a salt of brine wash; (2) the strong change and (3) the finish. When four operations are utilized we would have (1) the partial saponification and brine wash; (2) a further saponification with a brine wash; (3) the strong change and (4) the finish.

THE KILLING OR FIRST BRINE CHANGE

In order to obtain a more thorough understanding of the operations carried out in making soap by the full-boiled process, attention will be focussed on a concrete example brine wash, strong change and finish. In this particular case we will use the procedure. Assume that we charge the kettle as follows:—

Tallow or mohua oil	28%
Coconut oil	20%
Rosin	2%
Total charge	20,000 lbs.

SELECTION OF RAW MATERIALS

It should be emphasized that much care in selecting the raw materials for the making of toilet soap base must be exercised. The most commonly used mixture for this base is tallow and coconut oil; The proportions of oil to tallow may be varied within certain limits according to the desire of the manufacturer. It is quite customary to use about 75 per cent tallow and 25 per cent coconut oil.

In other words the manufacturer should look to titer of composition. If it is too high the soap may crack after milling and plodding.

To carry out the killing change with the charge stated above about 20,000 lbs. of tallow and 2,000 lbs. of coconut oil are put into the kettle. The steam on the open steam coils is turned on and just enough steam is admitted to agitate the fats gently. Then the caustic soda lye of 10°Be is gradually run in. Gentle boiling is continued and after a period the mass in the kettle begins to thicken due to a partial saponification of the fats.

Should the contents of the kettle show a tendency to become too thick, salt is added to check this. Soapmakers refer to this premature thickening as "bunching." It may become quite troublesome, and serious if it is not properly checked because the large lumps occlude unsaponified fat and are difficult to thin out. The amount of salt to be added to prevent this condition cannot be definitely given but it may be stated in a general way that 200 lbs. to 400 lbs. will usually be sufficient for the charge indicated. if the lye is added too rapidly and the mass in the kettle assumes a granular appearance, the lye should be shut off. Water should

then be run to the kettle until the mass smoothes out again.

Another precaution which is necessary is controlling the swelling of the mass in the kettle. If this swelling goes on too quickly, the whole charge is apt to run over. When the danger of swelling appears, the steam should be shut down and, if this is not sufficient to stop it, cold water should be run into the kettle at once. In some cases long-handled paddles are used when there is danger of the kettle running over. The paddling of the soap on the surface permits the escape of heat and steam and thereby assists in checking the swelling.

After the fat charge and lyes in the kettle have been boiled for what is considered the required length of time, a small sample is taken from the kettle to represent as nearly as possible a uniform one. This is done with a trowel. A little of the sample is then cooled between the thumb and fingers. Then the soap on the finger is touched to the tip of the tongue. If the bite thus sensed is strong or very sharp, an excess of lye is present. If there is no bite, more lye addition is necessary. In the case of a strong-bite the boiling is continued for a time. Another sample is taken and tested as before. If it is still too strong then more fat and oil must be added. The proper condition is arrived at by this test when only a weak bite is sensed by the tongue. When this point is reached the mass will be somewhat thicker than at the beginning of the saponification, but not too thick. The degree of thickness depends on the strength of the caustic soda lye used in carrying out the saponification. The most desirable density of the lye for this operation is about 30°Be. This density, however, will be influenced somewhat by the amount of steam condensed The thickness of the soap is also influenced by the amount of water used.

At this stage of the change, if the soap is too thick it is necessary to add water and possibly lye to thin out the mass. This the manufacturer does by taking the precaution of maintaining the boil in the kettle while the water is being run in. It is a dangerous procedure to run in water so rapidly as to cool off the mass and lose the boil. Not only does this apply to adding water but also to the addition of lye. If the lye is run too rapidly, it settles to the bottom of the kettle. The steam accumulates underneath, and when sufficient pressure is built up, breaks through with more or less violence causing the kettle to boil over violently. This is very distressing and dangerous.

The addition of too much water makes it impossible to carry on proper boiling and causes the production of too much lye. When the mass in the kettle on test is found to run off a hot trowel rapidly as a thin, heavy liquid, the mass is ready to be grained out.

GRAINING

Graining soap for a brine change is accomplished by either spreading granular salt over the surface of the boiling mass or by adding a strong brine solution directly to the kettle. Either the dry salt or the brine will accomplish the graining operation, though a brine solution is the more satisfactory. The advantages of using brine are that it can be distributed over a greater surface of the kettle, thereby permitting a more even distribution of the salt in the mass. Then too, there will be no accumulation of undissolved salt at the bottom of the kettle such as is often present when dry salt is added to the soap too quickly.

To carry out the graining, the salt or brine is added while the kettle is boiling. It is soon noted that a considerable quanti

ty of salt has been added before the graining is evident. The first change in appearance is indicated when the soap becomes rough and cracked looking instead of having a smooth, slimy appearance. If more salt is added, this curd-like appearance becomes more and more apparent until the point is reached where a sample if soap taken from the kettle by means of trowel separates into soft soap grains and clear lye. When this point is reached, the addition of salt is discontinued and the kettle is boiled for a short while longer, so as to assure a thorough mixing of the salt solution throughout the soap. Should too much salt have been added and the grain becomes too hard, this can be corrected by the addition of more water.

By the addition of salt solution to the partially saponified soap, the salt has thrown out of solution any soap which may have been dissolved in the water. This is due to the fact that soap is practically insoluble in a salt solution of sufficient strength. The percentage of salt required to carry out this result is about 9 to 13 per cent.

When the proper stage for the almost complete separation of soap and spent lye is obtained, as is indicated by the trowel test, the steam is shut off to allow the kettle to settle, having the soap and unsaponified fat floating on top. It is advisable just before the settling to draw off a small sample of the soap mass and allow it to cool in order to observe if the spent lye is clear when the soap has cooled. Should this not be the case further boiling and the addition of more salt is necessary. When the spent lye is satisfactorily clear, the mass in the kettle is allowed to settle.

SECOND BRINE CHANGE

After the soap kettle has settled, the next operation is to draw off the spent lyes through the valve at the bottom for the recovery of glycerine if desired. On drawing off the spent lye, the first operation consists in turning on the open steam coil gradually until the soap boils quite vigorously. As this boiling continues, the soap-boiler turns on the water and continues the boiling until the soap is thinned out so that it is smooth and slimy in appearance known to soap makers as "closed." There will be no particular difficulty encountered in obtaining this condition if the operations have been properly conducted under the first change.

Should the condition occur, however where the soap remains grained or open after continued boiling and the addition of the proper amount of water, the error is due to one of several things. First, it may be that all the lye from the first brine change has not settled out properly. Second, it is possible that if dry salt has been used to bring about the grain, this has all dissolved in the lyes and is now going into solution with the result that the soap becomes grainy again. If this difficulty is encountered, the best procedure to use is for the operator to grain out again.

Should no difficulty be encountered in closing the soap in the kettle, the rest of the oil and tallow indicated in the charge is added to the kettle while it is boiling. Caustic soda lye is then added to the kettle in exactly the same way as that described under the first salt change. When all the fat and oil has been added, it is necessary to proceed with greater caution. When the further quantities of lyes are added, special care must be taken that there is sufficient caustic soda present to complete the saponification, but at the same time caution must be exercised to make sure that there is no considerable excess of lye at this point. At no time should the contents of the kettle cease boiling when this operation is being

carried out. After the lye addition has been made, the procedure of salting out or graining the kettle exactly follows that which was described under the first brine change.

The above two operations may be combined into one by first boiling the portion of the fats and oils with caustic lye 10°Be as mentined above. When the fats and oils have absorbed almost the whole the alkali found by test the remaining fat and oils are put into the kettle and the requisite amount of caustic lye of 18°Be as stated is added and boiled until the saponification is almost complete. At this stage brine solution is stirred in and boiled in the manner already stated. In other words only the salting out operation is carried out in one operation and not by two stages but the other operations namely the boiling of fats and oils are followed in the same manner maintained.

The length of time a pan of soap requires to finish depends entirely on the weight of soap treated, and may very from five hours for small charge to 12 or 15 hours for a large one. The end of the operation is ascertained by taking out samples from time to time by means of the ladle and examining them. They should have a firm consistency, be free from any oil or fat, which would show that more alkali is required, and when tasted have only a faint biting sensation on the tongue. To an experienced man the appearance of the soap is a guide.

5. SALTING OUT OR GRAINING

This operation is carried out in the manner already stated above. On standing for 4 or 5 hours the mass in the pan separates into two distinct layers; the upper consisting of the soap while the lower layer is the spent lye. The lye is now run off from the soap into storage tanks ready for the recovery of the glycerine.

THE STRONG CHANGE

The strong change is an important operation in making soap by the full-boiled process. Its purpose is to saponify completely the charge in the soap kettle by "killing" or saponifying the last traces of fat and oil. If resin is to be added, it is added to the kettle during this change. It is not necessary with the small addition of rosin to saponify it separately. However, should larger percentages of rosin be added, as would be the case in certain yellow laundry soaps then it would be advisable to make the rosin soap separately.

The first step in making the strong change is to draw off the spent lyes from the preceding brine wash taking the usual precaution. After the lye has been entirely drawn off the steam on the open steam coil is opened gradually. When the contents of the kettle boil satisfactorily, water is added and the boiling is continued until the soap in the kettle assumes the closed condition. When this condition is attained, lye is added slowly but not continuously. The best procedure is to add the caustic soda solution of 20°Be for a few moments, and then boiled so as to produce a homogeneous mass. It is not possible to state exactly the amount of lye required to saponify completely and grain out the charge in the kettle at this point. This amount depends upon the quantity of water present in the soap mass and also upon the strength of the lye which is being added. As a general rule, it is desirable to have the lye of as great a density as possible. It is possible to secure the desired condition with lyes testing as low as 25°Be. In any circumstance, it is necessary that the contents of the kettle be kept boiling continuously and if the lye additions should cool the soap to such a point where the boiling is lost, the addition of the lye must be discontinued im-

mediately. Here again we have the possibility of the lye going to the bottom of the kettle and causing a boil-over when the steam pressure overcomes the lye pressure.

FILLING THE SOAP BASE

Of the various materials used for filling or "building" soap, there are only two which are used in very large quantities. These are sodium carbonate or soda ash, and silicate of soda. These two materials can be compounded with the full-boiled soap base in varying quantities.

The immediate effect of adding soda ash to soap base is to stiffen the mass considerably due to the fact that it takes up water, from 2.5 per cent to 2.8 per cent of dry soda ash is the maximum amount which should be added to soap base. The limiting factor in the amount of soda ash to be added is the tendency of the soap to open and show a "bloom" or frosty deposit at an early age. Soda ash may be added to the soap in the crutcher either in the dry form or in a strong solution. When added dry, care must be taken so that the lumps are well broken up before adding it to the soap. When added in the form of solution the percentage of water in the solution should be kept down in order not to dilute the soap too greatly.

The temperature of the soap when filling materials are added is important especially in the case of soda ash, and depends upon the nature of the soap. The filling solution is better taken up between 140°-160°F. In no case the temperature should exceed 160°F or a separation will occur. The firmer the body of the soap the higher the temperature of the soap may be.

The addition of silicate [illegible] soap is probably [illegible] of soda ash. It can be added more easily, but the operation cannot be carried out carelessly and be successful. The percentage of silicate of soda which may be added to the soap varies according to the composition of the soap. As high a percentage as 50 per cent. silicate may be added successfully to the soap. At times even this percentage is exceeded when soaps are made by the cold, semi-boiled processes. Soaps containing a considerable amount of coconut oil are specially capable of holding high amounts of filling materials, especially silicate of soda.

In cases where considerable amounts of silicate of soda are to be added to the soap, the finish of the soap should be strong or open. The reason for this lies in the fact that the silicates of soda manufactured for filling soaps readily combine with sodium hydroxide. If then the finish of the soap is not strong enough to work well with the silicate of soda, the whole mass in the crutcher stiffens up to such an extent that it impedes the movement of the agitator in the crutcher. Should this condition be encountered, the operator must quickly add a small quantity of liquid caustic soda which should be readily available. This addition will presently make possible the movement of the agitator and cause the mass thin out when the proper amount of caustic is present. Some soap makers make a practice of adding a small percentage of caustic soda lye directly to the silicate of soda in the storage tank before it is added to the soap to saponify it.

A settled soap base containing as high as 2 per cent free alkali can quickly be reduced to [illegible] per [illegible] te additions since it requires some time for mixture of caustic soda and the silicate of soda to come to a state of equilibrium [illegible] ed to the silicate, this should be completed

a day or two in advance. If this is not done, the finished soap, although having a good appearance, is very apt to irritate the hand. It has been observed that diluted mixtures of silicate and caustic soda come to the state of equilibrium more rapidly than concentrated mixtures. This being the case, it is advisable that when caustic soda is added to sodium silicate the mixture be diluted and heated. Most soap makers heat it to a temperature of about 160°F. In cases where the silicate is added to the soap base directly in the crutcher, the temperature of the mass should be as low as is consistent with good crutching. A temperature near that of soap is the most desirable to produce a smooth running soap.

—Vulcanisation of Latex & Latex Products

THE field for the utilisation of latex has been considerably extended by the discovery of vulcanised latex. In latex itself we have the equivalent of an aqueous solution of rubber which can be adapted to replace the solutions in volatile solvents which have been previously used, thus avoiding the disadvantages attached to such solvents. These include relatively high cost, difficulty of recovery of the solvent, inflammability of the solvent, formation of explosive mixtures with air and of a generally noxious character. Some solvents (chlorinated hydrocarbons) are non-inflammable, but, on the other hand, they are more poisonous than the naphthas, while carbon disulphide the most efficient of all solvents is poisonous, very inflammable, and readily explodes when mixed with air.

An aqueous solvent has also some disadvantages, but they are of minor importance. It takes more heat to evaporate a pound of water than a pound of volatile solvent, but, on the other hand, it is possible to work with much higher concentrations of rubber solutions, so that there is less liquid to evaporate. Once, however, the rubber is deposited, vulcanisation becomes necessary, whether the rubber be deposited directly from latex or from a rubber "solution."

With the discovery of the possibility of vulcanising latex (vultex process), subsequent vulcanisation is unnecessary, for the deposited rubber is a vulcanised rubber and the process of manufacture is finished with the deposition of the rubber.

The methods of vulcanising latex are similar to those used for vulcanising rubber, the vulcanising ingredients being mixed in the latex instead of the raw rubber obviously a much easier and simpler operation. Heat is then applied to the latex mixture under controlled conditions.

The first successful vulcanisation of latex was obtained by heating with polysulphides. These substances contain much sulphur loosely combined which splits off readily, and as many of them, such as ammonium sulphide, are water-soluble, the conditions appear ideal for vulcanising. If, however, sulphur is used, it can be obtained in a more finely divided form than ordinary flowers of sulphur, and therefore less liable to settle out of the liquid. Precipitated sulphur is finer, but the finest of all is the so-called colloidal sulphur, the particles of which are so small that they do not settle out during vulcanisation. If the temperature required is above the boiling point of water (212°F or 100°C), the latex is heated in steam under pressure, that is in a steam pan or vulcaniser (auto-clave). This is necessary in all cases except those in which powerful accelarators are used. Most accelerators are complex organic substances added to the latex in small proportion, e.g., 1 per cent. for the purpose of facilitating vulcanisation. Under their influence a lower temperature and a shorter time of vulcanisation is practicable. By means of accelerators, full vulcanisation of latex can be obtained in 24 hours at a temperature not exceeding 40°-50°F. With the most active accelerators vulcanisation takes place gradually at ordinary room temperatures, so that the mixed latex, sulphur and accelerator set aside long enough is found to be vulcanised. Latex preserved with ammonia is quite suitable for vulcanisation, but if it is desired to carry out the process in the plantation, fresh latex can be used.

Vulcanisation does not alter the general appearance of the latex. It is only after removal of moisture and examination of the film of rubber left that the vulcanisation is apparent. It appears that the vulcanisation of latex consists in the vulcanisation of each individual particle, so that on agglomeration and cohesion of these particles vulcanised rubber is produced. It is not possible to enter here into details of the methods of making vulcanised latex. By suitable and usually minor modification, the results obtained with raw latex can be duplicated with vulcanised latex, so that subsequent vulcanisation, if desired, can be avoided. During the vulcanisation of latex in a steam pan some evaporation at the surface may occur, but with suitable precautions little or no loss will result from this cause. Also mineral matter and relatively heavy ingredients, including the sulphur, will tend to sink to the bottom of the vessel and will be left behind on decanting the latex. There will therefore be some difficulty in making a highly compounded rubber in this way These difficulties do not apply if in the place of ordinary latex, concentrated latex or latex paste (Revertex) be used. These can be vulcanised like the raw latex by incorporating the ingredients and heating, preferably in dry steam. Owing to the greater consistency, added mineral matter will not be deposited, and it should be possible in this manner to produce a vulcanised paste or highly concentrated vultex with a much-heavy mineral matter incorporated with it as may be desired.

An alternative to the use of vulcanised latex is the use of a compounded latex containing vulcanised ingredients, that is, a vulcanisable latex. So soon as the latex is converted to rubber, whether by coagulation or evaporation, vulcanisation of the product can be effected. For this purpose it is not necessary to dry the coagulum first. Vulcanisation can be carried out when the mass is in a moist state and the mass dried subsequently, or the two operations may be conveniently carried out simultaneously.

By the employment of very active accelerators, that is, ultra accelerators, it is possible to prepare vulcanised latex at temperatures well below 100°C. In this way the use of a steam pan may be avoided and replaced by some form of water bath or steam heater. The vessel is merely lightly covered to prevent evaporation as far as possible and the contents may be gently stirred.

Similarly, vulcanisable latex may be prepared so that the moist gel or coagulum therefrom is vulcanisable at or below steam heat.

MANUFACTURE OF SYRUPS

As an adjunct to aerated waters, or even for the production of non-effervescing drinks, syrups are as indispensable as water. The sugar employed in making syrups should be white granules or cubes, and free from ultramarine or other colouring matter which is added in traces to sugar with the object of neutralising the yellowish tint. Syrups are prepared in different ways, the most usual method being solution of the sugar by heat; other methods are by shaking or percolation, without heat, this being employed when the flavouring or other addition would be volatilised by heat, syrups are strained through flannel bags and clarified by heating with white of egg, which is removed as a scum, or shaking with pulped filter paper. Syrups are apt to deposit crystals in cold weather, and if made stronger than the official strength. Mr. F. H. Alcock states that potassium carbonate 1 gr. to syrup 12 oz. prevents crystallisation. Invert sugar forms in syrup on keeping. It is generally understood that syrups should not be poured hot into the stock bottles and stoppered at once, because steam that rises, is condensed on the sides, trickles down, and forms a layer of water on the top. This, mixing by diffusion with the syrup, may form a weak saccharine solution on the surface, and thus favour fermentation. Syrups should be stored in well-dried bottles, completely filled, well stoppered in a cool, dark place.

FRUIT SYRUP

With the exception of raspberry, strawberry and black currant, fruit syrups are rarely made from the fresh fruit, artificial essences, artificial colouring, and acidulated simple syrups sufficing to give combinations which are pleasing to the public. We may, however, state the general formula for natural fruit syrups as follows:—

Press the juice out of the fresh fruit, strain, and add 6 per cent of alcohol (90 per cent) and the suitable proportion of permitted preservative. Set aside for 24 hours, to allow the pectinous precipitate to form; decant from this, and strain the sediment through flannel, returning the filtrate until clear. Now measure out a gallon of the juice thus prepared and in it dissolve, by bringing to the boil quickly, 12 lbs. of granulated sugar. Set aside to cool, skim and bottle.

Note—The permitted preservatives for fruit syrups are sulphur dioxide or benzoic acid. The limits allowed in a pint of fruit juice are sulphur dioxide 3 gr., sodium bisulphide 5 gr., sodium metabisulphite 9 gr., sodium sulphite anhydrous 6 gr., sodium sulphite crystals 12 gr. or benzoic acid 5½ gr.

Another method of making syrups from fresh fruit is as follows:—

The fruit is cleansed, washed with warm water and reduced to pulp by mashing in a large earthenware or marble mortar. The pulp is then placed in a large vessel in a warm place, to ferment stirring occasionally for three or four days. The juice is then placed in a cloth, drained, and the more pressed, then set aside to complete the fermentation and clarification. The juice should form a clear solution when mixed with two volumes of alcohol, this indicating the precipitation of the pectin which would cause decomposition. The fermentation is hastened by adding 2 % sugar to the crushed fruit. To make a syrup for each pint of clarified juice add to it glycerin 1 oz. sugar 1¾ lb.

Heat to dissolve and strain through flannel. Whilst hot place in sterilised bottles, quite filled, and cork tightly to exclude air.

Fruit jams may also be used in the proportion of jam 4, water 4, alcohol 1 Mix and after two days filter and dissolve sugar 4 in the filtrate.

BANANA SYRUP

This may be prepared from the fruit by mashing 1 lb. of bananas to a pulp, adding 1 pint of water, and 5 pints of simple syrup, bringing to the boil, straining, and adding citric acid 2 dr. dissolved in water ½ oz.

MULBERRY SYRUP

Mulberry juice	1 pint
Refined sugar	2¼ lb.
Alcohol	2½ oz.

Heat the mulberry juice to the boiling point and filter when cooled. Dissolve the sugar in the filtered liquid with the aid of heat and then set aside to cool. Lastly add the alcohol.

STRAWBERRY SYRUP

Take of fresh ripe strawberries 10 quarts, white sugar 24 lbs. water 2 pints Spread a portion of the sugar over the fruit in layers, let it stand four or five hours; express the juice, strain, add the remainder of the sugar and water, raise to boiling point and strain. To the strained syrup add the permitted preservative mentioned above and alcohol 2 oz.

PINEAPPLE SYRUP

Pineapple	8 ch.
Rosewater	1½ seer.
Sugar candy	8 ch

Peel off the fruits and remove the undesirable parts of the fruit. Then cut the fruit into thin small slices and cook 8 ch. of this in 1 seer of rosewater for half an hour and then remove from fire Mash the fruits in the rosewater to get an extract and finally strain through a cloth. Then cook the sugar candy in the remaining quantity of rosewater to get a syrup. After 10 minutes pour in the pineapple extract and boil for another 15 minutes when it is ready to be phialed.

Dose:—1 tollah in 2 ch. of water

Use:—Is a strength-giver and helps digestion.

LEMON SYRUP

Lemon peel (Pati)	2 oz.
Lemon juice	20 ,,
Sugar refined	36 ,,

Take the ingredients as stated above, namely the peel of pati lemons, juice extracted from lemons and refined sugar (Cossipur 1st. grade) and not ordinary sugar which causes fermentation in the final product. First of all the lemon peels are to be cooked in the lemon juice for 10 minutes over a slow fire. Then sift and strain through a cloth. To the extract thus obtained now add the sugar and cook for 15 minutes which brings the operation to a close. If properly prepared this syrup shall weigh 56 oz. and occupy a volume of 41 liq. oz. The lemon syrups ordinarily obtained in the market are not natural products but made from artificial sources of which we shall speak later on

ARTIFICIAL FRUIT SYRUPS

Now let us come to preparation of artificial fruit syrups. The method of prepartion is based on mixing artificial fruit essences with simple syrups. The fruit essences impart the characteristic flavour of the particular fruits; sometimes the tinctures of the actual fruits also serve as the essential principle of the syrups.

As the basis of these is simple syrup we begin with its preparation at the very outset.

SIMPLE SYRUP

Simple syrup, as it is generally called consists of crystallised sugar dissolved in

water. The limit of solubility of cane sugar in water at the ordinary temperature of 60°F is about 65¾ per cent of the weight of the syrup. In other words, it takes 34¼ lbs. of water to dissolve and hold in solution 65¾ lbs. crystallised sugar at a temperature of 60°F. Much more than this amount will dissolve if the water is heated about 60°F and in boiling water it will dissolve in all proportions, but the excess sugar dissolved in hot water will crystallise out as soon as the syrup is cooled again.

Invert sugar is much more soluble in water and an invert syrup will hold up 88 per cent of sugars without crystallising. The proportion of granulated sugar to water is as follows:—

Granulated sugar	30	lbs.
Water (boiling)	7	quarts.

Pour the sugar into the water gradually stirring meanwhile, and when dissolved, strain through coarse cotton cloth. Do not cover container until thoroughly cooled. This will produce 4 gallons of syrup. The relative proportions of sugar and water are very important since if a smaller amount of sugar is employed, fermentation sooner or later will ensue. If too much sugar is used, crystallisation will follow, resulting in a liquid too thin to keep under ordinary temperature.

BANANA SYRUP

Simple syrup	1	gal.
Citric acid solution (1 in 2)	½	oz.
Artificial banana essence	1	„

SYRUP OF LEMON

Sugar	8	ch.
Water	6	„
Citric acid	(as directed).	

Prepare an ordinary syrup by boiling refined sugar in water for 10 minutes over a slow fire. Then add to this citric acid, the usual proportion being 1 dram of the acid to 6 oz. of the syrup. For securing cheapness sometimes dilute sulphuric acid is used in place of citric acid, the proportions remaining same.

ORANGE SYRUP

Tincture orange	1	oz.
Simple syrup	7	„

Prepare the simple syrup as usual. To every 7 oz. of the syrup now add 1 oz of tincture of orange, which gives the required syrup.

SYRUP OF APRICOT, BLACK CURRANTS, PEACH ETC.

The basis of artificially flavoured syrups is a mixture of 6 pints of simple syrup and 2 pints of water, 1 oz. citric acid or tartaric acid and the permitted preservative being dissolved in the water. The following are the flavours and colourings required to be added to this volume of syrup:—

Apricot

Essence of apricot	½	oz.
Liquid cochineal	2	dr.

Black Currant

Essence of black currant	3	dr.
Liquid cochineal	1	oz.

Peach

Essence of peach	½	oz.
Liquid cochineal	2	dr.
Caramel	1	„

Pear

Essence of pear	½	oz.
Caramel	2	dr.

Pineapple

Essence of pineapple	3	dr.
Tinct. of saffron	6	„

Mango

Essence of mango	4	dr.
Tinct. chlorophyl	2	„

The essences should in each case be mixed with double their volume of alcohol. Other fruit syrups may be made similarly, using from 2 dr. to 6 dr. of the essence to a gallon of acidulated syrup.

THE CURING OF GINGER

EXPERIENCES in ginger-curing are narrated by the Agricultural Chemist to the Government of Ceylon in the pages of THE TROPICAL AGRICULTURIST. As comparison has been drawn with the Indian methods of ginger-curing we summarise the article for the benefit of our readers.

Ginger is grown fairly extensively in the Central and Western Provinces of Ceylon, but almost the entire crop has been sold, up to now as raw ginger. With the marked fall in price of this commodity, however, the question of the preparation of dry ginger became of importance and was seriously taken up by the Department. Ceylon ginger has the reputation of drying badly, but whether this was due to faulty curing methods or to its poor quality was not known. Our experience has indicated that while both factors are responsible for the trouble, the inherently poor quality of the local ginger is the primary cause. Local ginger has undoubtedly deteriorated in quality owing to improper methods of cultivation, neglect of manuring, etc That by suitable artificial manuring the quality of sample of locally grown ginger has been markedly improved, is evidence in point Local ginger is inferior to the Indian varieties in size and thickness of hand, fracture and internal colour, and has generally a higher fibre content than the latter. In addition to the purely local variety, ginger imported from India within comparatively recent times is grown to some extent locally.

METHODS

The primary object of the curing investigations undertaken was to determine the method most suitable for the varieties of locally grown ginger. There are two known methods of drying ginger (1) ordinary curing, (2) sulphur-lime curing The former is adopted in all ginger-growing countries, but the second is practised only in certain districts in India.

ORDINARY CURING

Ordinary curing was carried out as following:—The ginger was soaked in water overnight, peeled by hand with bamboo knives, washed again in water and then left to dry in the sun on bamboo barbecues. Frequent turning of the ginger when drying was found necessary. When completely dry, the ginger was again washed in water and re-dried in the sun. This practice was avoided if weather conditions were not satisfactory. Good sunshine is essential for ginger drying. Rainy or cloudy weather results in the product becoming mildewed and spotted and giving a musty odour and flavour. Ginger should be thoroughly well dried before it is bagged.

MODIFICATIONS

Numerous modifications of this process have been adopted at various places. In certain parts of India the ginger is soaked in water for as long as two days. In Jamaica the hands are placed in water immediately they are uprooted, for, should the ginger be dried with the soil and roots adhering to it, the product will not be white

Peeling in Gujarat is carried out either by scraping with a piece of earthenware shell or by rubbing the rhizomes on a coir string bedstead. In Jamaica ginger peeling is considered an art. The expert peels between the fingers of the hand and the less experienced, peelers the other portions. Narrow-bladed knives are used in peeling. In certain parts of S. India no peeling is done, but after being

well washed the ginger is trod under foot in the washing tank. This considerably lowers the cost of production.

The peeled product should be immediately put into a tank of clean water and thoroughly washed with frequent changes of water. This has been found very necessary if a light-coloured dry product is to be obtained. On exposure to air the peeled rhizomes darken considerably in colour and this stain persists. Where ginger is being cured, a good source of water supply should therefore be near at hand.

In order to obtain a whiter product peeled ginger, after washing, is soaked for some hours in lime water and then allowed to dry. The lime may then be washed off, if required. Liming improves the keeping quality of the ginger.

Drying is carried out in Jamaica on cement barbecues, and, in certain places in India, on mats and gunny bags on the ground. The latter practice should be avoided if the ground is wet or damp. In certain districts in India after the ginger is well dried, it is carefully rubbed by hand on a coarse gunny bag and then allowed to dry again. This is said to improve the white colour of the dry product.

SULPHUR CURING

In sulphur curing, the green ginger was treated as in the ordinary method but after peeling it was placed in a tank of lime of the consistency of whitewash for a period of about two hours, during which time it was stirred once or twice. The ginger was then put into wicker or coir bottomed baskets and placed on bamboo racks or shelves in a closed chamber and sulphured for 4 hours. A mud-wall room 6 ft. by 6 ft. by 6 ft. was used for this work. It had a door at one end and a hearth opening from the outside at the other. The hearth consisted of an iron pan or tray supported on a semi-circular wall about 1 ft. 6 ins. high. Sulphur was placed on the tray which was then heated from below. The quantity of sulphur used in the first instance was 7 lb. per 1500 lb. of green ginger. The next day the ginger was placed in the sun to dry and in the evening the liming and sulphuring process repeated, 8 lb. of sulphur were used this time and the period of sulphuring was increased to 12 hrs. The process was repeated a third time, the quantity of sulphur having been increased to 9 lbs. and the period of exposure shortened to six hours. The product was then left to dry on the barbecue and when well dried, the lime was washed off and rhizomes left to dry again thoroughly.

The dry ginger so obtained is a comparatively plump, almost white-coloured hand with a good fracture. It is much less susceptible to mould and insect attack than ordinary dried ginger. The disadvantage of the method, apart from the small extra cost and the trouble necessary, is that the product so cured is not saleable in all countries owing to the sulphur dioxide it contains.

It is recommended that only sound, fully-developed rhizomes should be used for drying. While the first year rhizomes are best for drying, second year rhizomes can also be used advantageously.

The great advantage of curing is that when there is no market for raw ginger owing to an over-supply, it would be a means of preserving the crop for at least a period of a year.

—Useful Notes on Bhilawan Shell Liquid

BHILAWAN shell liquid is obtained from the pericarp of the Bhilawan nut, also known as the marking nut, on account of the use of this liquid for marking linen indelibly The following extract from a Bulletin of the Imperial institute, London will give a clear idea regarding liquid.

The tree (semicarpus anacaradium) which yields these fruits is a deciduous tree growing under forest conditions in Central and Southern India and along the sub-Himalayan tract, up to an altitude of 3500 ft. It is found throughout the hotter parts of India as far east as Assam The tree also occurs in the West Indi and Australia. It grows to a height of 20 to 40 ft. with a girth of 4 to 6 ft. The fruit is a drupe, 1 in. long and nearly as broad. The upper part of the fruit is cup-shaped, smooth, fleshly, orange-red in colour and when ripe, sweet and edible The lower portion, termed the nut, consists of a smooth, black, shining pericarp which contains a corrosive resinous juice which is brownish or black when the fruit is ripe and has strong vesicant properties. The average dimensions of the nut are 1 inch long, ? inch broad and ½ inch thick, and its average weight is 3.5 grams. Inside the nut and protected by a hard shell is a white kernel, which is stated to be as sweet and nutritious as the almond cashew kernel.

The resinous juice occurring in the honeycomb structure of the pericarp has been investigated by several observers. Mr. Naidu in 1925 obtained the juice from Bhilawan nuts by making superficial incisions in them, care being taken that the cuts did not penetrate the hard shell covering the kernel. These treated nuts were then extracted with ether and gave as yield of 21 per cent of a thick dark oil. Another method Naidu used was to crush the whole nuts between rollers and to extract the pasty mass with cold light petroleum The extract after removal of the solvent was shaken with cold alcohol (90 per cent V/V) volume by volume in which the oil from the kernels is insoluble After removal of the alcohol from the solution and washing with water to remove catechol, a yield was obtained of 18 5 per cent expressed on the whole nuts. This observer reported the presence of the following constituents in the juice extracted:—Catechol 0.4 per cent.; Anacardol 37.3 per cent.; two phenolic acids $C_{17}H_{18}O$ and $C_{1\cdot}H_{14}O_4$ 4.4 per cent., which can be separated by means of their barium salts; another acid and a sugar.

Later, Pillay and Siddiqui in their examination of Bhilawan shell liquid did not find any anacardic acid or cardol which are present in cashew nut shell oil nor any anacardol or catechol as shown by Naidu to be constituents of Bhilawan shell liquid. They isolated from the juice, of which a yield of 28 to 36 per cent was obtained by extraction of the nuts with ether, femecarpol, 0 1 per cent., a monohydroxy phenol, boiling point 185°-190°C at 2.5 mm and solidifying below 25°C-to a fatty mass; bhilawanol an orthodihydroxy compound at $C_{21}H_{32}O_2$, 46 per cent. distilling at 225°-226°C at 3 mm, and solidifying below 50°C; and a tarry corrosive residue, yielding no identifiable compound.

Bhilawan shell liquid has been used in India for medicinal purposes. Diluted with emollient oils it is employed externally in the treatment of skin affections and internally for rheumatic complaints, epilepsy, and nervous debility. Recently, considerable interest has been displayed in

the use of this material for industrial purposes. Ajamani in 1942, published a paper on the preparation of baking enamels from Bhilewan shell liquid. He used for his tests the product obtained by the extraction of the crushed whole nuts with cold petrol. He found that he could prepare from this product storing enamels with hard, glossy and elastic properties. the films showing good resistance to water, acid, petrol, alkali and heat. When kept for 45 minutes at 280°-300°C polimerisation of the shell liquid took place with a loss of 14 per cent. The polymerised product, after the addition of turpentine and polymerised linseed oil gave storing enamels with satisfactory properties.

Investigations carried out since 1940 under the auspices of the Board of Scientific and Industrial Research India, have led with working out of processes for converting Bhilawan shell liquid into non-vesicant, semi-solid to solid products, which can be used in the manufacture of lacquers, varnishes, enamels, insulating materials and moulding plastics. Siddiqui found that on boiling the shell liquid with formaldehyde and hydrochloric acid or on heating it with a metal catalyst or on heating it to 200°C with 0.5 to 5.0 per cent of sulphur, it was transferred into a black resin, which when thinned with solvent and applied to metal surfaces and baked at 140°-200°C formed very tough, hard, elastic films, resistant to acids, alkalies, and most organic solvents and withstanding temperatures as high as 300°-350°C. Bhilawan shell liquid has also been employed for regenerating rubber waste for the production of hard semi-hard and soft rubber goods. The use of a chlorinated product of this shell liquid as a co-solvent for rotenone extracts in insecticidal preparations has been patented.

Bhilawan shell liquid can be prepared by solvent extraction of the nuts or by heating them. Upto about 1943 it was not being produced on a commercial scale. In that year a special plant was designed and constructed for its largescale production. The plant consisted of a series of inclined iron retorts of semi-elliptical cross section, placed in firebrick chambers, provided with dampers and connected by flues to the fire place and chimney. The furnace ensured a temperature control with 25° from 200°-500°C. In this process, which is being employed on a commercial scale, the shell liquid obtained does not contain any bhilawanol and consists entirely of a semi-polymerised product. It cannot, therefore, be used in cases where the presence of bhilawanol is essential, but it is suitable for the production of enamels, lacquers, varnishes and certain other plastic compositions Siddiqui and Khan have evolved an improved process in which the shell liquid is obtained by exposing the nuts to superheated steam at temperatures ranging from 180°-230°C in closed retorts, provided with an inlet for steam and an outlet for the expelled shell liquid. The product obtained by this improved process is comparable with that obtained by solvents extraction.

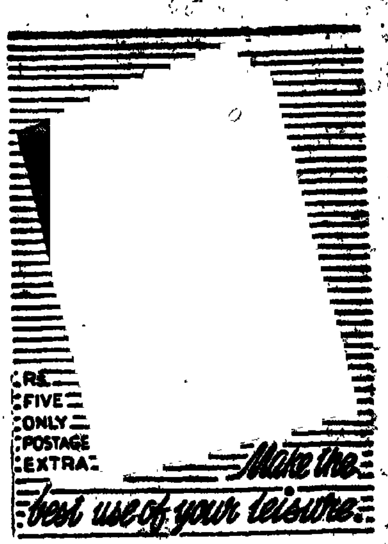
Statistics are not available to show the quantities of Bhilawan nuts that could be collected annually, but it is stated on the strength of reports from the Central Provinces, Madras, and Hyderabad State that with proper organisation nearly 50,000 tons of these nuts could be gathered every year.

—MAKING OF BATTERY ACID

CHEMICAL manufacturers and dealers are frequently called upon to supply dilute sulphuric acid for storage batteries, so that the following particulars regarding the qualities and specific gravities of the acid will be found of interest and the table useful for reference. Two important matters in connection with acid used for accumulators are quality and concentration. To prepare the dilute sulphuric acid, B. P. and of specific gravity 1.84 should always be taken, as commercial varieties contain too many impurities. The specific gravity of the filling acid depends on the nature of the service which battery has to perform, and on the relative volume of the electrolyte to the mass of active material with which it is associated For instance it is commonly agreed that a concentration of 1.21 to 1.22 is the most suitable for central station and car lighting types of batteries on account of the abundance of acid possible in the containers During the discharge the specific gravity is accordingly not seriously reduced per ampere hour of current supplied. On the other hand, in such a type as a car-starting battery where a large surface area is exposed to a relatively small volume of acid the specific gravity drop per ampere hour on discharge is considerable, and in order that the battery may be able to deliver its capacity before (the specified gravity of the electrolyte has fallen below a practical value, it is essential to start with a much higher concentration on the fully charge state. Thus a fully charged starter battery may appropriately have an electrolyte of specific gravity 1.3. It will be seen, therefore, that the apparently slight variations in the strengths of the acid recommended by the manufacturers are of greater importance than is generally supposed. Particularly in the case of small accumulators, such as those used for filament lighting in the radio apparatus (generally 2-6 volt, 30 ampere hour actual capacity), it will be found that the specific gravity of the acid rises somewhat during the charging—for example, in the first charge, acid of 1.2 will probably become 1.23. It is recommended that in the case of accumulators in celluloid cases the acid be emptied out immediately after the first charge and the container refilled with new acid of the same strength as that discarded, namely, in this case, 1.23. This is advised in order to remove traces of impurities which may have been released from the celluloid during the charging. frothing in accumulators in the course of subsequent charges is attributed to these impurities, and probably the best way of overcoming the difficulty is by refilling with fresh acid. The addition to the acid of a trace of oleic acid is another remedy which has been suggested. Loss of electrolytic due to evaporation should be made good with distilled water, not acid. In addition to the quality and concentration of the acid, the use of distilled water is equally important, owing to the impurities in ordinary water. It is better and more accurate to weigh the required quantities, and for that reason in the following table, the amount of water to which 1 lb. of B.P acid should be added to produce the required specific gravity is given by weight.

Specific gravity	Distilled water for 1 lb. sulphuric acid, B.P.	
	lb.	oz.
1.17	3	$1\frac{1}{8}$
1.175	2	$14\frac{1}{8}$
1.19	2	$10\frac{3}{8}$
1.2	2	8

Specific gravity	Distilled water for 1 lb. sulphuric acid.		Specific gravity	Distilled water for 1 lb. sulphuric acid.	
1.21	2	5½	1.25	1	13¼
1.215	2	4½	1.26	1	12½
1.22	2	3½	1.27	1	10¼
1.225	2	2½	1.28	1	9¼
1.23	2	1	1.285	1	8¼
1.24	1	15½	1.3	1	7



—FRUIT FOR THE MILLIONS

NATURE'S nursery is in the tropics, the region of colour, warmth and sunshine, and the best for vegetation. Some of the best fruits of the world are to be found here and banana is one of them. This cheapest and possibly the best fruit of India is being cultivated here from the dawn of civilization.

ORIGIN & GEOGRAPHICAL DISTRIBUTION

Although the natural home of banana is in the tropics, wild and cultured varieties have made themselves at home in sub-tropical regions, and even in the cooler regions as in the Himalayas, where it is found in the wild state even at 4,000 ft. to 6,000 ft. and is cultivated at 7,000 ft. above sea-level. It has spread all over the tropical world probably from its original home in India or Malaya and today it is given throughout the warm regions, except the desert areas which are too arid. The following extract from INDIAN FARMING VOL. X No. 8 will no doubt help our readers in cultivating this nourishing fruit.

IMPORTANT VARIETIES

The two most important varieties from point of view of utilization are *paka kala* (banana) and *Kacha kala* (plantain), the former is eaten raw and the latter is eaten after being cooked. All our Indian varieties are confined to only one sub-species *Sapientum* under the species *Musa paradisiaca*. The dwarf (*Musa Cavendishii*), known as *Singapuri Kala*, is very popular throughout India, differing from the others in that it loves a cooler climate and the fruit when ripe remains the same pea-green in colour.

The most important provincial varieties are:—Sabri or Martaman and Champa in West Bengal, Poovan and Nendan in Madras; Basrai and Tambadi or Tambeli in Bombay; Champa in Assam; Anpan and Chinia or Chunia Kela in Bihar; Palanpodan and Yethen in Travancore, Rasabala and Salambale in Mysore.

The varieties Martaman and Lalchal in West Bengal and Bombay respectively as well as the hill bananas of Madras are rather costly and are generally preferred by the rich.

WHY CULTIVATED

It has been estimated that the total area under banana and plantain is about 20 per cent of the total area of two million acres under all fruits in India and next to mango which has the highest acerage of all fruits. Of these provinces Madras has the maximum acreage, next comes West Bengal, although due to partition the major areas has gone over to East Bengal. The present acreage in West Bengal might be more or less some 50,000 acres. As is revealed by available statistics banana gives the maximum yield per acre (being highest in West Bengal yielding 500 maunds per acre) and as such can support a greater number of people, the units of caloric produced per acre being highest than a similar area of any other crop under the most favourable conditions. Moreover this huge produce can be preserved indefinitely by preparing meal from the dried fruit without affecting the food value.

The young innermost leaf of banana is used as a dressing for burns as well as for covering boils and blisters. From Ayurvedic point of view plantain curry is a recipe for bowel troubles and the roots and stems are tonic, antiscorbutic and useful in disorders of blood.

[illegible] of fruit is [illegible] months after [illegible] though there is a great variation [illegible] in time among the different varieties or even among individuals of the same variety, the minimum being 6 months and the maximum 12. At maturity the inflorescence emerges from the rhizome through the pseudostem and large number of flowers are closely crowded in the axils of the bright protecting bracts. The inflorescence binds over end when a sufficient bunch of fruit has set the pendant extremity (*mocha*) with the remaining unopened flowers and bright bracts, should be cut away to give better scope for the remaining fruits to develop, which in most cases are seedless. The Singapuri banana takes the maximum time for fruiting, viz: 2 to 3 years usually at intervals of 5 months or a little more when the successive crops are secured.

After full growth and ripening the bunch of fruits is severed and hung up in a dark warm place for further ripening and the plant is cut and removed to give room for the development of the [illegible] through [illegible] vegetable.

NUMBER OF FRUITS IN A PLANT AND YIELD PER ACRE

The number of fruits varies [illegible] different varieties, though it much [illegible] on soil condition and manuring [illegible] mum being 50 in a bunch and [illegible] maximum 200. Annually the average [illegible] per acre in India is 155 maunds. [illegible] Bengal the yield per acre is 500 [illegible] Mysore gives the lowest yield being [illegible] maunds only. Other provinces give [illegible] following yields:—Assam—200 [illegible] Madras — 160 maunds; Bombay — [illegible] maunds; Bihar—90 maunds; and Travancore—49 maunds.

FOOD VALUE OF THE FLESH OF THE FRUIT

The value of the banana fruit [illegible] already been realized from the fact that [illegible] produces maximum calories per acre. [illegible] comparative self explanatory chart adopted from Datta in Science and Culture [illegible] (8) of the best two fruits of India is given below:—

Protein	..	0.15	0.1
Fat	..	0.17	0.1
Starch	..	18.2	7.9
Vitamin A	..	Very good quantity.	Good quantity.
Vitamin B	..	Nil	Do
Vitamin C	..	Rich contents.	Do
Vitamin D	..	Nil	Do
Vitamin E	..	Nil	Very good quantity.
Calcium	..	Nil	Good quantity.
Iron	..	Good quantity.	Do
Phosphates	..	Nil	Very good quantity.

SOIL AND CLIMATE

Subject to liberal supply of water and [illegible] suitably close to a tank, ditch, [illegible] or river, banana can be grown [illegible] soils, except where the soil is heavy and the sub-soil is hard rock or stiff clay. In one word the soil should be deep and well drained. Banana, being a gross feeder, maintenance of soil fertility is of supreme importance. Where [illegible]

brought under plough the question ... does not crop up at once, but ... must be given to this question in the future. In poor soils the plantains ... be removed every 10 years and ... exhaustive crops should be grown if the land is not left altogether fallow.

In India banana is cultivated from Cape Comorin to Himalayan heights and is thus subject to a wide range of climatic conditions. But it is a lover of warm, moist climate with a high degree of rainfall. This is why banana grows best in Bengal; next comes Madras and then Bombay. The extreme climates of Northern India hinders the extension of banana plantation there.

PROPAGATION

After ripening of the bunch, the pseudo-stem bearing it is cut back close to the rhizome, and from here lateral offshoots or suckers are developed and the growth is continued by them. Thus, the life of the individual plant is indefinite. The extra suckers (there should not be more than three at the base), are removed for establishing new plantations in June or July. Sometimes sections of rhizome with one or two buds are also used for propagation.

PREPARATION AND PLANTING

Where virgin soil is brought under plough, the question of preparation is not a problem but in case of cultivated lands, preliminaries for the preparation of soil is of supreme importance. Firminger's method is recommended: Soil operation should be begun any time before rains. Soil is deeply ploughed and left to the action of the elements. Then just as the rain break, sann hemp (crotalaria Juncea) at the rate of 40 lbs. of seed per acre is sown. This will come up vigorously with the rains. After some weeks it is cut down and ploughed in situ; let it rot well to harrow again. At the ... pits, 12 ft. apart, are dug for ... trees and between them a crop of deep-rooted legume is given to break up the subsoil,—a short season groundnut such as small Japanese, is admirable. The nuts are harvested and the roots, stem, etc. are retained to the sub-soil.

One year after the start of soil operation suckers are planted in pits within fields of standing *aus* paddy, arum, brinjal, ginger, if not nuts already mentioned. The suckers should be about eight months old, with adult foliage as opposed to "sword" suckers, which are younger with narrow leaves. As has already been said, suckers are usually planted in the rainy season. The pits should be about a cubit deep and should be manured. Sometimes dried banana leaves are burned and put into the pits to check termites; fresh cowdung is also added.

MAINTENANCE OF SOIL FERTILITY

However rich the soil may be, the fertility level should always be maintained as far as banana is a gross feeder. The banana plant absorbed from the soil a moderate amount of nitrogen, little phosphorus and a very large amount of potash, the latter accounting for 10 per cent. of total potash lost from the soil. The scheme of manuring should be aimed at maintaining the equilibrium of the replenished earth. In India farmyard manure, oilcakes and bonemeal are used as well as wood ash and bonemeal, though the latter were not frequently used by the orthodox cultivators earlier. Compost is now, a by word. If, however, this excellent manure is not available, fresh night soil may be used. Firminger suggested 15 lbs. of farmyard manure, 5 lbs. of bonemeal and 7 lbs. of wood ash per plant for the first year and 5 lbs. farmyard manure, 5 oz. of bonemeal and ...

CONTROL OF DISEASES AND PESTS

Panama disease (more popularly known as banana wilt caused by the fungus *Fusarium Cubense*) first attracted attention in Panama and Costa Rica early in this century, and caused serious loss and abandoning of cultivation in large areas in the West. From the survey of the banana areas of tropical American and West Indies, it has been concluded the fundamentally the disease developed as the result of unfavourable soil conditions. Flood fallowing of areas affected by wilt has given effective results as has been definitely concluded by Wardlaw from observations and experiments carried out in the West. This flood fallowing, however, may not be successful in the case of acid soils.

In the East, serious loss is caused by a disease, which passes under the name of "bunchy top" and was originally supposed to be associated with the attacks of the nematode. *Heterodora radicicola*. This supposition has been reviewed by scientists who have indicated that the disease falls into the group of virus diseases not directly transmissible. In this case the agent of transmission is the aphid, *Pentalonia nigronervose*. This trouble has been effectively controlled by the total destruction of the diseased plants.

The black rot disease, caused by the fungus *Ghosporium musarum*, is responsible for the loss of fruits on the plant as well as in the store. Spraying with ammoniacal copper carbonate prevents it from the malady. There is scope for raising improved varieties, especially disease resistant ones, through breeding.

The question of quarantine measures which of late has been in the lime light should be seriously considered. For example, if a particular area has been notified from wilt to check the spread to other provinces; the same method should be applicable to other diseases as well. It is a remarkable fact that banana has no serious insect pest in India which can justify control measures.

Earth Worm (*Pheritima indica*) creates havoc sometimes, specially when rainfall is very heavy. It enters the pseudo-stem from the earth and even goes up to the young inflorescence and is responsible for the black scars on the fruit.

PLANNING A PLANTATION

Cultivation of banana and plantain is based on two different considerations. One is for trade and the other for home consumption. For the former big commercial plantations are required and for the latter, a part of the kitchen garden.

The first consideration of planning a plantation is the selection of site. It should be as near a city and a railway station as possible, otherwise marketing will be greatly hampered for transport difficulties. The approximate cost of cultivating one acre has been estimated at Rs. 225/- as detailed below:—

Cost of 350 plants	Rs. 45/-
Cost of planting in the pit	Rs. 35/-
Cost of ploughing, etc	Rs. 20/-
Cost of manure, etc	Rs. 125/-
	Rs. 225/-

Apart from the cost of cultivation, cost of maintenance, supervision and fencing has also to be incurred, which are not detailed, as also the profit which may be obtained from the secondary crop cultivated in between the planting and fruiting time, as well as the prices obtained from the fibre extracted.

In the first year the return is always poorer than the succeeding crops, but in the first year inter-cropping is the common practice, (which however is not practicable where the intervening distance is less than what has been indicated earlier) and it yields some profit. In the first year more than 300 bunches may be obtained, which is doubled or trebled in the succeeding years, as there will be three suckers of different ages left in the stool, after cutting down the parent plant after harvest. The average market price for each bunch is near about Rs. 2/-.

There is a wide variation in the distance at which bananas are planted in India. As close spacing always leads to almost total exhaustion of the soil, it is better and wiser to make the intervening spaces wider which ultimately give better result in quality, size and quantity of the yield.

MARKETING

On account of the perishable nature of the fruit banana requires special handling and the fruit must be cut at a stage of maturity adapted to the length of the journey, and in case of longer journeys, special provision for cool chambers are necessary. According to Wardlaw and McGuire a storage temperature of 54°F is generally aimed at during transportation. Sometimes the stem end of the bunch is smeared with vaseline or melted paraffin to check diseases, and to keep the fruits fresh for a longer time. The special adaptability of the Champa variety, which stands longer journeys well without special care, has led to its extended cultivation in Northern and Eastern India. The best provincial varieties are generally limited to even a district due to their soft peel, which requires special methods of crating.

Banana is the only fruit of importance which is available in the market throughout the year, although there is seasonal variation in supply.

ECONOMIC ASPECT

Fibres extracted from banana closely resembles that of M. textiles (popular as Manila hemp), although not so strong. Wild varieties should be explored for extraction of fibre. Mr. J. K. Sarkar gives in his Handbook of Plantain Fibre and Fruit Industry a long list of articles that can be manufactured with the fibre, such as rope, twine, chord, nets, bagging, sacking, matting, carpeting, lace, plaits, braids and even handkerchief. Even the coarsest fibre can be utilized for paper-making and the rejected tow for packing and stuffing purpose. The only difficulty is the expense of transporting to the factory, which however, can be overcome in case of large plantations, where this industry may develop as a by-product. The dried, powdered and sifted flesh of the fruit (banana or plantain meal) should preferably be manufactured from mature but unripe fruits, as the starch changes into sugar during the ripening process. Essences and attars may be prepared from ripe bananas though synthetic products might be cheaper. Alcohol can also be manufactured. Jams, jellies and marmalades can be manufactured with profit. *Kshar* is prepared by burning dried leaf sheaths of banana or plantain plant and this detergent, which is equal in action to washing soda, is being utilized by our village people, for washing their cloths by boiling from times immemorial.

PHARMACEUTICAL RECIPES

THYMOL MOUTH-WASH ESSENCE

Dissolve 1 part of thymol in 99 parts of Eaude Botot prepared from the following formula:—

Orris-root (cut small)	1½	oz.
Cinnamon (in coarse powder)	6	dr.
Galangal (cut small)	6	,,
Cloves (coarsely bruised)	6	,,
Aniseed (coarsely bruised)	6	,,
Cochineal (finely ground)	72	gr
Oil of pippermint	2	dr. 12 gr.
Balsam Peru	72	gr.
Coumarin	½	,,
Oil of orange flower	12	mins.
Otto rose	7	,,
Dilute alcohol	35	oz.

Macerate for 3 days, with frequent shaking, strain, press, and filter.

INHALANT

Menthol	4	dr
Creosote oil	1	oz
Pine oil	1	,,
Eucalyptus oil	1	,,
Gaultheria oil	4	,,
Cajuput oil	4	,,

Mix.

MOSQUITO LOTION

Formalin	15	oz.
Xylol	5	,,
Acetone	4	,,
Canada balsam	1	,,
Perfume	q s	

Shake the bottle and apply a little of the lotion to the mosquito bite by means of a small piece of cotton wool.

SKIN AND BLOOD MIXTURE

Ferri-ammonio-Citrus	1	dr
Mag Sulph	2	,,
Potash Iodide	24	gr.
Tinct. Zingiber test	24	mins.
Infusion Columbae Conc.	½	oz
Decoction Sarsaparilla Conc.	½	,,
Aqua Chloroform sufficient to produce	6	oz

Mix. Adult Dose.—One tablespoonful in water thrice daily.

INDIGESTION MIXTURE

Sodi bicarb	4	oz 6 dr.
Bismuth carbonate	1	,,
Magnesium carb	1½	,,
Spt. ammon Co.	4½	,,
Chlorodyni	1½	,,
Aqua chloroform	30	,,
Aqua menth pip. sufficient to produce	90	,,

Mix. [illegible]

SPIRIT OF SAL VOLATILE

Ammonium carbonate	4	oz.
Strong solution of ammonia	8	,,
Oil of nutmeg	288	mins.
Oil of lemon	28½	,,
Alcohol (90 p.c.)	120	oz.
Distilled water	60	,,

Mix the essential oils with the alcohol and water in a retort, and distil 140 oz and then separately 9 oz. To the second distillate add the ammonium carbonate and solution of ammonia, heat in a well-corked bottle on a water bath to 60°C, shaking occasionally until the ammonium carbonate is dissolved, cool, filter through cotton-wool, gradually add the filtrate to the spiritous distillate.

ANTI-PHLOGESTIC PASTE

Kaolin	505.0	grms.
Boric acid	45.0	,,
Thymol	0.5	,,
Methyl Salicylate	2.0	,,
Oil of peppermint	0.5	,,
Glycerine	387	,,

Take kaolin and heat it to 110°C to drive off all traces of moisture and then allow it to cool and reduce to fine powder. Now mix the kaolin with the boric acid, and then thoroughly incorporate the warm glycerine, which has in the meantime, been rendered anhydrous by heating it for a short time to 100°C Finally add the thymol, dissolved in the methyl salicylate and oil of peppermint, and make into a homogeneous mass. Preserve it in air-tight containers.

This mixture possesses emollient and antiphlogestic properties and is therefore largely used to allay inflammation in the treatment of pneumonia, boils, carbuncles, etc and in dermatological practice.

RHEUMATIC PAIN KILLER

Menthol	15	gr.
Chloroform	1	oz.
Oil of wintergreen	1	,,
Camphorated oil	1	,,

Dissolve the menthol in the chloroform, then add the oil of winter-green and then the camphorated oil.

WORM LOZENGES

Santonin	3	grm.
Pulv. Tragacanth	3	,,
Powdered sugar	54	,,
Powdered cocoa	40	,,
Vanillin	1.0	,,
Water		sufficiency.

Make into a stiff mass and then roll into a stick. Cut into 100 lozenges [illegible]

—Recipes for Small Manufacturers

SILVERING POWDER

Silver chloride	1 tola.
Common salt	1½ „
Washing soda	3 tolas.
White chalk powder	2½ „

Powder each separately and weigh in a well dry condition and mix well the whole and pack it in 1 oz. size screw top or wide-mouthed cork bottle.

For silvering the articles made of brass, copper, German silver, etc., first clean them well with chalk powder and wash with clean water. After cleaning the articles from dirts and traces apply this silvering powder with a small piece of clean cotton rag when the article is wet. Rub briskly all over the place with this powder for some time and wash with water. Two or three coats in this way will give a good deposit of silver on the articles. To get cleaner and brighter surface on the article it must be cleaned thoroughly before applying this powder.

SILVER OR PLATE POWDER

Jeweller's rouge	8 oz.
Heavy magnesium carbonate	8 „
Light precipitated chalk	16 „

Triturate the rouge with 2 oz. of the chalk for 5 minutes, and gradually add the rest of the powders. Shift three times.

HEEL-BALL

Carnauba wax	3 lbs.
Hard paraffin	1 lb.
Tallow	6 oz.
Ivory black	12 „
Powdered acacia	4 „
Powdered sugar candy	4 „

Melt the waxes and tallow, add the other ingredients previously mixed, continue the heat and stir until homogeneous, then pour into leaden moulds previously wetted.

ADHESIVE FOR FASTENING SPLIT LEATHER

Starch	3 oz.
Rectified spirit	8 „
Gelatine	1 „
Water	1½ „
Turpentine oil	1½ fl. oz.

First rub up the starch powder and spirit. Then in a separate pot soak the gelatine in water for an hour and then dissolve it by applying gentle heat or over water bath. Now add the turpentine and while this glue compound is boiling hot stir in the starch paste and raise to the boil for a few minutes. This compound, when properly prepared, will not penetrate through the fibre of the leather to spoil the dyed surface.

SOLID STENCIL INK

Black rosin	20 parts by weight.
Shellac	16 „ „
Bone black	14 „ „
Rosin spirit	2 „ „
Japan wax	2 „ „
Tallow	1½ „ „
Hard yellow soap	½ „ „

Melt the rosin, shellac, and rosin spirit, add the tallow and wax, stir well, add bone black and soap (sliced), stir until all dissolve and incorporate, then turn out into the moulds to set hard.

TRANSFER LABELS

Transfer labels may be prepared with the following tracing ink.

Sandarac	1 lb.
Rosin	½ „
Indigo or other pigment	1 lb.
Carbon tetrachloride	80 oz.

Melt the sandarac and rosin over a slow fire and add the indigo after triturating it with carbon tetrachloride.

DEODORISING SPIRIT

Spirit	1 gallon.
Powdered slaked lime	5 dr.
Powdered alum	2½ „
Spirit of nitrous ether	1 „

Mix the lime and alum and add them to the spirit shaking the mixture well together, then add the spirit of nitrous ether and set aside for some days, shaking occasionally, finally filter.

TAILOR'S CHALK

WHITE

White wax	4 parts.
Hard soap	2 „
Bleached shellac	2 „
Zinc oxide	1 part.

Melt the wax, soap and shellac and stir in the zinc oxide then mould to shape and dry slowly and carefully.

RED

White wax	7 parts.
Hard soap	3 „
Orange shellac	4 „
Indian red	1 part.
Venetian red	1 „

Proceed as before.

BLUE

Tallow soap	21 parts.
Orange shellac	19 „
Prussian blue	8 „

Proceed as before.

—IN THE FIELD OF INVENTION

FISH STORAGE

As a result of experiments conducted at the Atlantic Fisheries Experimental Station, Canada, it has been found possible to double the keeping time of fish by reducing the storage temperature by only 5° from 37°F. to 42°F. (Fisheries News letter, 1949, 8, 15).

Fish were stored for 10 days at 32°F. and at 37°F. and periodic measurements were made of the tri-methylamine content. The concentration of this substance is the best available measure of the extent of spoilage in such fish as cod or halibut. When the trimethylamine value reaches 12-15, the fish is beginning to spoil, and between 20-30 it has a definite spoiled odour. The results indicate that (i) fish have large number of spoilage bacteria capable of growing at low temperatures and (ii) a few degrees in the temperature of storage make a marked difference in the keeping time of fish, if the range is close to freezing.

ALUMINA-PAPER CHROMATOGRAPHY

The use of Alumina-Impregnated filter paper in chromatographic partition of large water-insoluble organic molecules has been recently described. This method has been used in the separation of vitamin A alcohol, esters of vitamin A, retinene and other Carr-Price chromogens (Nature, 1949, 164, 673).

Strips of Whatman No. 54 filter paper, which combines great wet strength with a loose texture, are dipped first in an aqueous solution of aluminium sulphate (65 gm. per litre), allowed to drain, and then dipped in dilute ammonia (2N). The immersion in ammonia should not be hurried, as the precipitated aluminium hydroxide, by forming a gelatinous layer on the surface of the paper, hinders the diffusion of ammonia into the body of the paper. When a heavy impregnation with alumina is desired, the papers may be dipped in stronger aluminium sulphate solution and allowed to hang over-night in a damp atmosphere saturated with ammonia vapour. The strips are washed in running tap water for at least 5 hr. and are then dried. Special drying temperatures and storage conditions are required. The activity of the paper, however, is not easily controllable, and it is more convenient to run an indicator spot parallel to the unknown on the same strip of paper. This indicator may be either a known sample of the substance to be detected or a dye such as one of the Brockmann alumina standardization dyes. A calibration curve may be constructed relating the R of a suitable Brockmann dye with that of the substance to be detected.

NEW FREEZING PROCESS

A new technique in ice manufacture that shortens the freezing process from about 20 to 3 hr. with a substantial saving in investment and production costs has been developed (Chem. Age, 1949, 61, 662).

Heat is abstracted by evaporating ammonia directly from the fresh water moulds instead of through the medium of brine used in the usual process. The block of ice thus obtained is of an exceptionally low temperature of—15°C. as against—4°C. attained in the old method. The use of warm gas in the new method (instead of warm water) for defrosting and loosening the ice block from the mould reduces cracking and shrinkage to only 2 per cent.

NEW CYANAMIDE CHEMICALS

The American Cyanamide Co. announces that a new group of cyanamide chemicals is now available in trial lot quantities.

Diallylcyanamide is the prototype with the dimethyl, diethyl and di-isopropyl cyanamides also available in experimental amounts. The diallyl-cyanamide is reported to be a liquid having a boiling point of 222 deg. C. and a freezing point below 70 deg. C. Less than 1 p.c. soluble in water at 26 deg. C., it is miscible with most organic solvents and acts as a solvent for most natural and synthetic resins.

The chemical reactions of diallylcyanamide are based mainly on the reaction of the nitrile group, and uses in the textile, rubber and plastic industries are anticipated.

NEW CHROMATE PIGMENT

A new chromate pigment (barium potassium chromate), known under the trade name Pigment E, is being produced on a pilot-plant scale (Chem. Trade J., 1949, 125, 637). This compound has a low water solubility and yields 25 to 35 per cent. more chromate ion per unit weight than the other soluble chromate pigments.

The pigment is produced by reaching potassium bichromate and barium carbonate at high temperature. The bichromate obtained as fine, crystalline mass is pulverized in a high speed, hammer-type Mikro-mill fitted with a 0.-0625 in. screen. Blending is effected in a combination ribbon-and-paddle type blender. Yields over 99 per cent. of the theoretical are obtained.

The kiln is heated by an open propane jet. The reactants are fed at a rate of about 300 lb. per hour and require about an hour to pass through to the discharge end. The finished pigment discharged from the kiln is obtained in yellow to greenish yellow nodules, varying from 0.125 to 0.5 in. in diameter.

The pigment has been found to be compatible and stable with almost all paint vehicles and pigments now in commercial use. Its exceptionally low reactivity towards the vehicle acids is responsible for the excellent storage stability of proprietory paints formulated.

FORMULAS, PROCESSES & ANSWERS

MOTTLED SOAP

1970 K.S., Nairobi—Desires to learn the method of making mottled soap.

There are two kinds of mottled soap known. One has a faint grey mottle scattered through its substance while the other has a prominent mottle or grain of a blue, red, or other colour. We will deal with former type first.

The fats and alkalies used in this preparation are generally contaminated with earthy matters and metallic impurities; these acting upon the fats formed by the alkali.

To produce mottled soap with a good grain requires some experience in soap-boiling. The method usually followed is to make a soap from tallow or bleached palm oil, using low grades of caustic and adding it in large excess. The soap is well boiled, and then it is boiled down with some lye until it begins to curd out; it is at once run into the frames, and these are covered over with cloths to keep in the heat. During the cooling the metallic soaps tend to aggregate together and so produce the mottle. One of the chief arts in making a mottled soap lies in the boiling; if boiled too long it sets too quickly and there is not time for the mottling to form property, Which if not boiled long enough, it is apt to contain an excess of lye, and the mottling settles out too quickly.

Blue or other coloured mottled soaps can be prepared in the following manner.

For preparing blue mottled soap two-soap pans are usually required. In one pan a sufficient quantity of soap is prepared from tallow and palm-kernel oil or coconut oil, from which it is afterwards removed to the second pan and for every 1,000 lbs. soap are added 250 lbs. of silicate of soda solution, the whole being thoroughly incorporated by boiling until the proper condition of mottling has been reached. This can be determined only by experience. The colouring matter, ultra-marine blue. worked up into a thin paste with water, is then slowly sprinkled over the surface of the boiling soap until the full quantity has been introduced; the amount of ultra-marine blue to the proportion of soap varies from 5 to 10 lbs. If the soap be in too liquid a state the colouring matter is apt to permeate the entire mass giving it blue tint throughout, and the desired mottled appearance will not be attained. When properly conducted the blue pigment shows in the soap in blue patches which appear in strong contrast to the white ground of the soap, giving it a pleasing appearance to the eye.

PREPARATION OF DRY GINGER

The first operation in making dried ginger or sunth is to soak the partially cleaned rhizomes in water. This rubbing cleans the rhizomes and also softens them. The soaking facilitates the removal of the outer skin. It is scraped off with a shell or broken piece of earthenware. The scraped ginger is now washed and exposed of three or four days to the sun on an ordinary threshing. The ginger is thus bleached and dried. It is again rubbed by hand. The operation is done carefully so that the shoots are not broken. The ginger is then bleached in the sun for three or four days, and again hand rubbed. It is now steeped in water for two hours, and exposed on a clean floor to the sun until it gets dry. When dry it is rubbed on a coarse cloth or coarse sacking. This removes any outer skin not previously removed by scraping. The sunth is now ready.

GLAZED TILES

Glazed tiles are used in increasingly large quantities for decorative and hygienic purpose. In the manufacture of glazed tiles a glaze or glassy covering is essential, as the body of unglazed ware is porous. The glazes are chiefly composed of some of the following substances; borax, soda, potash, china stone, flint, china clay, whiting, and one or more lead compounds. As some of these substances are soluble in water, they could not be used in the ordinary methods of applying the glaze (i.e. by dipping), and such substances must, therefore, be converted into insoluble ones. This conversion is affected by fusing certain ingredients of the glaze together, thus forming insoluble silicates. This process is known as fritting, and the fused product is termed frit.

The following are typical mixtures for making frits for glazed tiles:—

Borax	30	parts.
China stone	30	"
China clay	5	"
Flint	15	"
Whiting	14	"
Soda ash	6	"

The frit mixture is placed in a reverberatory kiln and, when fused, is run into water which granulates it.

The glaze is usually made of the following:—

Frit	50	parts.
China stone	25	"
White lead	25	"

The glaze mixture is ground with water to an extremely fine powder and then applied to already fired tiles by dipping into the glazed slip. The tiles are next allowed to dry and placed in saggers and fired until the glaze has fused to a uniform glassy covering.

GLUE

2028 H.G.T., Lucknow—Desires to know a process of making glue.

Collect cutting of hides, skins, tendons and other waste parts of animals from shoemakers or butchers. Soak well in milk of lime, i.e. water impregnated with lime. Wash well in a stream of water to get rid of lime. Boil the

[illegible] in water till the desired adhesive strength is obtained, then run off the liquid into a cistern to clarify with powdered alum any remnant lime and other impurities. Before cooling, draw off into moulds, and cut off in slices to dry in the air.

Another method of preparing glue from waste leather, it is first disintegrated with the help of what is known as "Hollander". This is then washed and subjected to an elaborate chemical treatment. For this purpose proceed as follows:—

Dissolve 1½ lbs. oxalic acid in 20 parts of water. Pour the boiling solution over 1 cwt. of leather waste. Keep the mixture in the water bath at a temperature of 80°C. When the leather dissolves gradually add 25 pints of water until a uniform mass results. Make ready a paste by slaking 5lbs. of quick-lime; add it to the above mass, mix the whole well. The mass will become friable and powdery.

Rub it through a wire sieve, and expose the still moist mass to the air. Within about a month's time the tannic acid is destroyed and the mass becomes lighter. Remove the lime by means of water and hydrochloric acid. Now by boiling this mass glue can be obtained.

SOFT SOAP

2094 S.O.M, Bombay—Wishes to have a process of making soft soap.

Linseed oil	25	lbs.
Groundnut oil	25	„
Rosin	5	„
Caustic potash lye 20°Be	50	„
Caustic soda lye 22°Be	14½	„
Potash carbonate	2½	„

Take the oils and rosin in an iron vessel and heat. When the temperature is about 100°C slowly run in the caustic potash lye with constant stirring. Add water small quantity at a time to make up the loss of water caused by evaporation. When the mass fobs add the caustic soda lye and continue boiling. Take care that the oil mixture does not boil over. When the oils and lye are well-amalgamated add the pearlash dissolved in 5 lbs. of water so as to keep the mass thin. When the soap is clear and transparent, it is ready to be poured in suitable container.

MATCH HEAD COMPOSITION

2152 M.A.C.S., Nigeria—Desires to know the formulas of match head composition and surface composition.

Potash chlorate	28	parts.
Glass powder	5	„
Sulphur	2½	„
Potash bichromate	1	„
Manganese dioxide	6	„
Rosin powder	¼	part.
Infusorial earth	¼	„
Glue	4	parts.
Water about	16	„

Glue solution is made by keeping the glue under water for 12 hours and melting the same on a water bath.

[illegible]

Red phosphorus	[illegible]	parts.
Antimony trisulphide	[illegible]	„
Glass powder	[illegible]	part.
Potash bichromate	[illegible]	„
Glue	4	parts.
Water	16	„

For trial the chemicals required for head composition may be thoroughly mixed with glue solution in a mortar and then the paraffined splint heads are dipped in the same. As for surface composition the chemicals for the same may be mixed with the glue solution in a separate mortar and the sides of match boxes may be painted by means of brush.

LIME MANUFACTURE

2189 K.L., Shivpuri—Desires to learn a method of manufacturing lime.

Lime is manufactured in kilns, which are of two classes, namely periodic and continuous. In this country, long flame, periodic kilns are generally used, though they are uneconomical regarding fuel and time; but they are employed owing to their simplicity and cheapness of construction. They are made of bricks on large stone, blocks, and arch being constructed two or three, feet from the ground with numerous outlets left for the passage of flame into the kiln. The fire burns under the arch, on the upper side of which the limestone is arranged in such a way that the bigger size is placed just above the arch. At the commencement of the operation the temperature of the kiln is slowly raised during the first six or eight hours to prevent the limestone arch from breaking into pieces; then a full red heat is maintained for three to six days, when the fire is allowed to extinguish and the kilns cool down. The main drawback of using this type of kiln is to remain idle for good length of time during discharging and recharging. Moreover, a large quantity of fuel is required to heat the walls of the kiln after each recharging. For this reason large manufacturers prefer continuous kilns; but as these are too expensive, small manufacturers in this country are still inclined to their old process.

LIQUID DEPILATORY

2179 M.A., Rawalpindi—Wants a recipe of liquid depilatory and also processes of deodorising kerosene oil and bleaching mustard oil.

Sodium sulphide	14	Parts.
Water	160	„
Rect spirit	4	„
Glycerine	20	„
Lavender oil	1	part.

Dissolve the sulphide in some of the water; add the glycerine and mix. Add the remainder of the water and finally the lavender oil, dissolved in the spirit, mix well and filter.

[illegible] KEROSENE OIL

Kerosene oil	1	gallon.
Chloride of lime	3	oz.
Slaked lime	3	"
Hydrochloric acid		q. s.

Mix the chloride of lime with the oil, and add Hydrochloric Acid until chlorine gas leaves to be given off, mixing thoroughly. Then pour oil to the slaked lime. contained in another vessel, and allow it to remain a couple of days. Then well mix up. Allow the lime to subside, and draw off the petroleum.

BLEACHING MUSTARD OIL

Treat the mustard oil with 0.2 p.c. of sodium hydrosulphate or 1 p.c. of aluminium persulphate. Boil the oil on a water-bath at a constant temperature say 75°C for about 2 to 3 hours. Finally wash the oil and warm over water-bath to drive off the moisture and lastly filter.

Another method is as follows:—

Treat mustard oil with 0.5 p.c. of sodium perborate. Heat the oil on a water bath at a temperature of 80°C and keep at this constant temperature for 1½ hours. Then add the anhydrous sodium sulphate into the oil and continue heating for ½ an hour more. Then allow it to cool and then filter. Lastly expose the filtered oil to the sun for a day or two after covering the surface with a fine cloth to keep off the dust.

BRONZE POWDER

2191 N.R., Bombay—Wishes to have a formula of bronze powder.

These are made in various ways:—

1. The alloy is laminated into very fine leaves with careful annealing, and these are levigated into impalpable powders along with a film of fine oil to prevent oxidation, and to favour the levigation.

2. The scraps, cuttings, and fragments of Dutch leaf are the materials for the German bronze powders. First brushed through a sieve and ground with gum water on marble slabs for six hours, the gum washed out, the powders sorted, dried, and a coating of grease given to make them appear more brilliant, and to protect them from oxidation.

3. Brandies Patent Process: In making bronze powders they first take precipitated copper. It is alloyed with zinc, cast into ingots rolled into rebunds, cut, annealed, and rolled until the metal is thin and leaf like, then it is taken to a steam-mill and ground. The bronze powder is washed out and dried, then introduced into an airtight room, with an arrangement of boxes; the air in the chamber is set in violent motion by bellows, and the powder diffused throughout; the bronze powders are deposited, the finest in the upper boxes, and the coarse powders below.

TINCTURE IODINE

2290 H.S.M., Gulbarga—Wants to know a formula of preparing tincture iodine.

Iodine	[illegible]	grams.
Potassium Iodide	[illegible]	"
Distilled Water	100	"
Alcohol (90%) sufficient to produce	1000	c.c.

The potassium iodide and iodine are dissolved in the distilled water. Finally add alcohol to produce the required volume.

WOOL WASHING

2242 M.M.H., Karachi—Wishes to know processes of wool washing and wool bleaching.

The impurities generally present in wool are: Wool fat, Suint and dirt yolk, which is insoluble in water but soluble in volatile solvents such as ether, benzene, naphtha and carbon disulphide. To clean wool perfectly any of the following three processes is sometimes followed. The processes are as follows:—(1) By dissolving the yolk with a volatile solvent and washing with warm water to remove the suint. (2) By scouring with alkaline agents. (3) By steeping to remove the suint, and scouring afterwards to remove the yolk.

The advantages of the first process are that (1) a solution can be selected that does not injure the fibre; (2) both the solvent and yolk can be recovered; (3) the process is made automatic. Unfortunately these volatile solvents are very inflammable, involving risk of fire, and giving off noxious fumes.

In order to carry out the operation successfully the wool is immersed in a bath or liquor specially prepared according to particular requirements. The wool is propelled forward and is then squeezed to remove superfluous liquor. This treatment takes away such impurities as grease. sand, dirt, etc. from the wool, and improves its colour and lustre.

The liquor in a steeping bath, consists of tepid water. The scouring bath consists of hot water, soap and alkali (potassium or sodium carbonate). The following rinsing bath is composed of warm water only. The removal of the loose dirt and potash salts is effected, in the first place, by steeping, while the grease is removed by emulsification in the scouring liquor, the dirt still held in the wool being afterwards removed by rinsing.

WOOL BLEACHING

First of all wash the wool or wool yarn thoroughly with soda ash and soap in the ordinary way. Then immerse the wool in a cold bath consisting of 2 lbs. of hyposulphite of soda dissolved in 11 gallons of water. Keep the wool there for an hour and then take it out. Next pour 6½ lbs. of hydrochloric acid (conc.) into this bath and again immerse the wool in it and allow it to remain there for another one hour. The vessel containing the wool must be well covered during the last treatment, and the bath must be large enough to conveniently handle the wool in it. The wool thus bleached keeps white for a longer time.

[illegible] LACQUER FOR WOOD

[illegible] J.M., Madras—Wishes to have formulas of [illegible] lacquer for wood, etc.

Wet Nitrocellulose	15	parts.
Ester gum	10	„
Diethylene glycol Monolaurate	8	„
Butyl acetate	10	„
Butyl alcohol	5	„
Ethyl acetate	8	„
Toluol	48	„

Mix.

POLISH FOR PLASTIC ARTICLES

Diatomaceous silica	100	parts.
Emulsifying gum (EmulsoneB)	10	„
Water	600	„
Naphtha	200	„

Mix.

SOLDERING PASTE

The semi-liquid mass termed soldering paste is provided by mixing zinc chloride solution or that of ammonia-zinc chloride with starch paste. For preparing this composition, ordinary potato starch is made with water into a milky liquid, the latter is heated to a boil with constant stirring, and enough of this mass, which becomes gelatinous after cooling, is added to the above-mentioned solutions as to cause a liquid resembling thin syrup to result. The use of all zinc preparations for soldering presents the drawback that vapours of a strongly acid odour are generated by the heat of the soldering iron, but this evil is offset by the extraordinary convenience afforded when working with these preparations. It is not necessary to subject the places to be soldered to any special cleaning or preparation. All that is required is to coat them with the soldering medium, to apply the solder to the seam, etc., and to wipe the places with a sponge or moistened rag after the solder has cooled. Since the solder adheres readily with the use of these substances, a skilful workman can soon reach such perfection that he has no, or very little, subsequent polishing to do on the soldering seams.

ACETIC ACID FROM MOLASSES

2254 B.D.G., Maholi—Desires to know a process of preparing acetic acid from molasses.

In converting molasses into acetic acid it is of primary importance to prepare wort first. This may be done by fermenting the molasses. As the growth of yeast is retarded by the presence of alcohol formed during fermentation, the molasses must be diluted sufficiently to ensure rapid and complete fermentation, a suitable density being 1,060. The dilution is sometimes carried out in the fermenting-vats, but is perfectly done in a mechanical mixer whence the diluted molasses is pumped by the vats. Rapid growth of the yeast is ensured by the addition of [illegible] in the form of 10 pounds of ammonium sulphate per 1000 gallons of diluted molasses. To inhibit the development of certain bacteria which decompose sugars without formation of alcohol, the above mixture is acidified by the addition of 1 gallon of sulphuric acid per 1000 gallons. These additions increase the density to about 1.063. This liquid is now called wort.

The wort so obtained may be fermented by yeast with the formation of alcohol. The yeast present in the atmosphere, or adhering to the interior surfaces of the vats, is sufficient to start fermentation without addition of yeast, the yeast cells multiplying very rapidly. The fermenting wort becomes warm, and the active evolution of carbon dioxide gas produces a thick, white foam on the surface. The period required for fermentation varies with the composition and acidity of the wort, the variety of yeast used, and whether open or closed vats are employed. With wort prepared as above, fermentation is complete in two or three days, the foam then disappears, and the density of the wort is reduced to about 1.010 by the conversion of sugars into alcohol. The resulting alcohol is now converted into acetic acid by inoculating the wort with suitable bacteria. The acetic acid is then separated by distillation, neutralised with lime and the solution of calcium acetate evaporated to dryness. The dry acetate can either be sold, or converted into commercial acetic acid by distillation with sulphuric acid.

BONE CRUSHING FOR MANURE

Bones are but rarely used for manure in their raw condition as they are received from the collectors. As they contain fat their decomposition in the soil takes a long time. So the first treatment of the bones received is to steam them under a pressure of 15 to 20 lbs. in order to melt and remove the fat. In some cases the fat is extracted even more thoroughly by the action of benzene. The boiled or steamed bones thus obtained are some times crushed into ½ inch or ¼ inch pieces, though there is no longer much demand for material so coarse; more generally they are ground down into "bone meal". A really fine powder is, however, rarely obtained, because the cartilage interferes materially with the disintegration unless special methods are employed. It is this crushed material which is also treated with sulphuric acid for the manufacture of dissolved bones. In glue-making the cleaner bones are picked out, and, after the fat extraction, they are broken up and steamed afresh at a much higher pressure and temperature by which process the collogen takes up water and becomes converted into gelatine, which dissolves. The bone residue is ground and sold as "Steamed bone flour". Owing to the removal of the cartilage, this material can be ground finely, and forms a dry friable powder very convenient for use as a manure.

The coarser of bone meal are converted into dissolved bones by being mixed with enough sulphuric acid to convert about half the phosphates into a soluble condition; steamed bone meal is

... treated with acid, but the product ... regarded by the trade as dissolved bones, ... should be called soluble bone compound.

WATERPROOF TEXTILES

2384 K.T.S., Bombay—Wants to have a process of waterproofing textiles.

Waterproofing is of two general kinds, one, when chemical treatment of the fabric results in the deposit of chemical substance that is water-repellent, and the other is when a water-repellent is applied directly. The first named process is as follows: Prepare a solution of acetate of alumina standing at 9°Tw. and heated to 100°F. Prepare a second solution of 25 gallons of water in which is dissolved about 25 lbs. of soap, heated to 100°F. Pass the goods first through the acetate solution, squeeze, and then pass through the soap solution, and dry. This causes an insoluble deposit of an alumina soap on the goods, and fabric is absolutely water-repellent.

The other process consists of impregnating the cloth with a solution of paraffin wax and stearic acid in benzene. About 2 or 3 oz. of equal parts of paraffin and stearic acid per gallon of benzene makes a most satisfactory proportion. After impregnating the goods, the fabric is dried in a machine provided with a condenser, so as to recover the benzene for re-use. Fabrics so waterproofed are practically impervious to water and the proofing lasts even longer than the utility of the cloth.

CAMPHOR

2380 V.K.N., Mathura—Desires to know a process of making camphor.

Camphor is generally obtained from a species of tree found chiefly in the island of Formosa. To extract camphor the wood is cut into small pieces and boiled with water in iron vessels which are covered with large earthen domes, lined with rice-straw. As the water boils, the camphor is volatilised along with the steam and condenses in straw. The crude product is next purified. For this purpose 100 parts of crude camphor are mixed with 2 parts of each of quicklime, and animal charcoal and the mixture is put in a glass vessel placed over a sand-bath. The heat is then continuously applied, the camphor is sublimed off and deposited on the upper part of the vessel. When the process is complete, the vessel is removed and allowed to cool.

BONE MEAL

2393 T.C.O., Alleppey—Wants to have a simple process of making bone meal.

A quicker method of making bone meal is to boil the bones in an iron or copper boiler with strong caustic lye. The proportion of bones and lye to be used is roughly 15 parts by weight of caustic soda or 7 parts by weight of caustic potash dissolved in 15 parts by weight of water. The boiling should be done in 2 or 3 hours. But even without boiling, the bones would become disintegrated, being simply kept in the caustic liquor for about a week.

Another method of softening bones is by mixing them in heaps with quicklime and loam. A layer of loam 4 inches deep is first spread and on this is put a layer of bones 6 inches deep and above this a layer of quicklime 3 inches deep. The layers of loams, bones and quicklime are repeated until the heap reaches a convenient height, when it is covered all over a thick layer of earth. Holes are then bored in the heap from the top and water poured down them to slake the lime. The mass will become friable, and the whole heap may then be mixed up and spread as manure on land.

Another method of bringing bones into a fine state of division without the help of a mill is to mix them with half or a third of their weight of clay or earth, saturating the mixture with urine, placing it in a pit and covering the pit up with two or three inches of earth. In 2 or 3 weeks the bones get disintegrated and the addition of wine makes them a better general manure. Fermented bones act more readily in the soil, and they are more valuable than bone-meal for light soil.

PRINTING COTTON TEXTILES WITH DIRECT COLOURS

2403 K.T., Rajkot—Wishes to have a method of printing cotton textiles with direct colours.

When direct colours are employed in printing cotton piece goods the following procedure is to be adopted. First steep the goods in a dilute solution of sodium phosphate to improve fastness. The dry and spread over a horizontal table.

In the meantime make the printing paste consisting of colour 1 tollah, water 1½ chataks, gum arabic solution 2 chataks, phosphate of soda 1 tollah and glycerine sufficient to make thick paste. Then by means of a hand block the goods are printed. After this they are subjected to steaming process for 1 hour and finally washed.

The following colours may be used for this purpose.

Cotton yellow: diamine fast yellow, Vesuvine orange, benzo fast scarlet, diamine red, benzo sky blue, diamine green, chloramine black, congo violet, dianil cotton brown; etc., etc.

SHAVING SOAP

2411 J.S., Jammu—Wants to have a good formula of shaving soap.

Tallow	10	lbs.
Coconut oil	2	„
Caustic soda lye 38°Be	5	„
Caustic potash lye 36°Be	1	lb.
Gum tragacanth	½	„
Water	1	„
Perfume with Caraway oil	1	oz.
— do — Lavender oil	½	„
— do — Thyme oil	2	dr.
— do — Tinct. of Musk	2	„
— do — Terpenol	½	„

Melt the tallow and coconut oil together over slow fire and keep aside. Again mix with the caustic soda and potash lyes in another vessel. Put the mixture in the tallow coconut oil mixture and stir well as is usually done in the cold process. When the soap begins to condense, mix the perfume, frame it and cover it up. Gum tragacanth should be dissolved well in water and mixed before the addition of perfume. Next cut into cubes and mould in the form of cups.

REMOVING INK STAINS FROM CLOTH

2413 B.S.C., Lucknow—Wants to have recipes of ink remover, vegetable stain remover, etc.

Oxalic acid	8	parts.
Sodium hyposulphite	2	„
Water	90	„

Mix. Apply over the ink stains and keep aside for an hour; then wash with clean water.

REMOVING VEGETABLE JUICE STAINS

a.	Chloride of lime	6	kg.
	Water	72	kg.
b.	Sodium carbonate, crystallized	12	kg.
	Water	24	kg.

Add the solution b to the suspension a, let stand and settle.

Syphon off the supernatant solution, filter it, and fill it into brown bottles. Seal corks with paraffin.

Use this way, or in aqueous dilution; on dyed cloth; test out the resistance of the dye against the bleaching action of the preparation.

This solution is known as Eau de Labarraque (Sodium Hypochlorite Solution).

REMOVING CATECHU STAINS

To remove catechu stains apply a little lime water over the fresh stains and then a weak solution of oxalic acid. Allow to dry and then wash with water.

GRAPHITE GREASE

2481 P.S.G.M., Titilagarh—Wishes to have a recipe of graphite grease.

Ceresin	7	oz.
Tallow	7	„
Graphite powder	3	„

Warm together the ceresin and tallow and gradually work in, with a stick the required amount of graphite powder. Stir until uniform and pack in tins when thickening begins.

CASEIN

2443 B.P.J., Lashkar—Wants to have a process of preparing Casein.

Casein is usually prepared from milk. For this purpose the milk should be freed from fat and subjected to the treatment of acids. Pure acids, such as acetic, sulphuric and hydrochloric acids, are employed for the precipitation of casein. A simpler method is the treatment of milk with sulphurous acid. To carry out the operation take 100 litres of milk in an earthen vessel. Take 120 grammes of sulphur and burn it inside a dome to form sulphurous acid in the form of gas. Introduce this gas into the milk in the finest jets through a spray as it is being stirred into the milk. Constant stirring is of essential importance. During the process of precipitation the temperature of the milk must be maintained at 50° to 70°C. The actual precipitation is completed in a few minutes. For the better utilisation of the sulphurous acid, the first tub, provided with a mechanical stirring apparatus, may be closed with a thick cover, so that the superfluous sulphurous acid can be used immediately for the precipitation in the second tub, which may be left uncovered. By this means the consumption of sulphur is economised. *In this method of precipitation* the casein is not separated in such a greasy state, but is precipitated in the form of fine white sand, which can easily and thoroughly be washed by hand. One great advantage of precipitation by sulphur lies in the fact that filter-presses or complicated filtering plants are rendered unnecessary. The casein is allowed to settle and the original milk solution is then drawn off in order to be employed for the extraction of lactine. The casein that has been filtered off is now frequently and abundantly washed with water, until, above all, the whole of the lactine has been dissolved out of it. But as through the use of ordinary water new impurities, such as lime, etc., which would combine with it and remain in it, would be introduced into the casein, distilled or rain water is usually employed.

WATCH CLEANING FLUID

2468 S.W.C., New Delhi—Wishes to have a recipe of watch cleaning fluid.

(A) Boil 1 oz. of oleic acid in 1 quart of water. Keep hot until ready for use.

(B) Boil 4 oz. of ammonia solution (6 per cent.) with 1 quart of water. Add 2 oz. of acetone and bring to boiling. Slowly mix solutions (A) and (B) and stir until uniform.

GELATIN FOIL

Gelatin	10	parts.
Glycerin	2	„
Alcohol	2	„
Water	98	„

Dissolve the gelatin in the mixture. The solution so obtained may be poured out thinly on glass plates by a suitable device. After drying the foils can be hardened by about 25% of formaldehyde.

The hardened foils can be pulled off their glass bases.

LITHOGRAPHIC INK

2541 R.L.W., Sivakasi—Desires to know a formula of preparing lithographic ink.

Mastic (in tears)	8	oz.
Shellac	12	"
Venice turpentine	1	"
Melt together, add wax	1	lb.
Tallow	6	oz.

When dissolved, add hard tallow soap (in shavings) 6 oz.; and when the whole is perfectly combined, add lampblack 4 oz. Mix well, cool a little and then pour it into moulds, or upon a slab, and when cold cut it into square pieces.

GRIPE MIXTURE

2573 S.H.M., Agra Cantt.—Wants to have a good formula of Gripe Mixture.

Distilled water	4	pints. 4 oz.
Spirit ammon Co.	3	dr.
Potash bicarbonate	1	oz. 3 dr.
Simple syrup	32	oz.
Aqua caraway concentrated	1	"
Aqua anise, concentrated	1	"
Aqua anethi, concentrated	2	"

Dissolve all the ingredients in the distilled water one by one.

Dose:—For an infant, half a tea-spoonful, two months old, one or two tea-spoonfuls. The dose may be gradually increased.

MENTHOL

2551 M.C., Neemuch Cantt.—Wishes to have a process of preparing menthol.

Menthol crystals may be obtained by chilling peppermint oil derived from Mentha piperita plant. For this purpose put a quantity of menthol oil in a glass vessel and surround it completely with freezing mixture of salt and ice. As the temperature of the oil diminishes crystals of menthol collect at the bottom of the vessel. These are then taken out, pressed in folds of blotting paper and kept in airtight bottles.

BOOK BINDING COVER

2548 C.P., Nagercoil—Desires to know a method of making book binding cover.

Book covers are now made in endless strips by using a composition of oils solidified by mixture with fibrous substances and colouring matter and pressed through embossed rollers, which produces a resemblance of morocco, but with sharper outlines and capable of being washed. First of all an oxidised oil is prepared by applying a drying oil to a tissue and exposing to the action of the air, and when dry spreading on repeated coatings until the enamel thus formed is about ¼ inch thick. The solid oil is then ground together with the tissue upon which it has been formed. Then a mixture is made consisting of 100 parts of oxidised oil, 10 parts of rosin, 10 parts of copal, 20 parts of white lead, 10 parts of colouring matter, 20 parts of saw dust and 10 parts of hard paraffin wax. Those substances are intimately mixed in a horizontal cylinder heated by steam. The cylinder is provided with a shaft with inclined wings by which the contents are carried forward and pressed out through an aperture in a similar manner as the clay in kneading machine. When the mixture is ready it is spread upon a basis of textile fabrics but principally consisting of paper combined with a fabric. A suitable agglutinant consists of: 12 parts of oxidised oil, 1 part of copal, 1 part of rosin, 24 parts of ochre, and 2½ parts of turpentine oil. The plate produced by the machine is afterwards divided in suitable pieces and the covers, if necessary, can be stiffened with paper board pasted to the back.

KIMAM

2676 M.J.P., Meerut—Wants to know a process of making Kimam.

The principle underlying the manufacture of kimam is almost the same as in the case of surti. The only difference to be kept in view is that while surti is to be marketed in solid condition, kimam is put on the market in the form of a thick liquid of various consistency.

Usually the water that is rejected after treating tobacco leaves in boiling water is made use of in the composition of the kimam. The tobacco wash to be of any value to the manufacturers must be strong enough to impart to the final product its characteristic taste and flavour.

The leaves most suited for the preparation of kimam are Hingli and Madras. But Rangpur leaves also yield a very good quality of kimam. Usually 1 seer of leaf gives 1½ seers of kimam.

Various kinds of spices such as cardamom major, cardamom minor, saffron, aniseed, coriander seed, etc., may be incorporated with the tobacco wash as flavouring agents may be used but in a particular preparation all these should not be jumbled up. Judicious selection of the ingredients alone can give a balanced product. The quantity of the spices to be added is a factor dependent upon the taste and requirement of the people for whom the article is meant. Addition of musk to the extent of 1 to 2 drs. for every seer of kimam also improves the flavour.

The spices are allowed to ferment in the tobacco wash. The proportion of the tobacco wash and the spices should be so adjusted that the product after the completion of the fermentation operation attains a syrupy consistency. Finally add natural ottos such as ottos of [illegible], patchouli, etc. just before packing.

BRIEF QUERIES AND REPLIES

Questions of any kind within the scope of Industry are invited. Enquiries or replies from our experts will be published free of charge in serial order. Questions are replied by post on receipt of As. 8 stamps for each question. Subscribers outside India are requested to send two International Reply coupons for each question. In order to facilitate the work of Editor's Department and to help prompt action the readers are requested to send enquiries in separate letters.

242 R.N.S., New Delhi—You may go through the following books:—Manufacture of Disinfectants and Antiseptics; Manufacture of Inks; Indian Perfumes, Essences and Hair Oils—all of the books published from this office, price Rs. 3/7/- each including postage. You may saponify oils and stearic acid at the same time.

243 R.L.S., Agra — We have no book no colouring leather. You may however enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta for the book.

245 B.K.R., Secunderabad—For screw caps and porcelain jars enquire of Radhabazar Bottle Store, 14, Radha Bazar Lane, Calcutta and P. S. Dutt & Bros., 8, Ezra Street, Calcutta.

246 J.C., Kottayam—Process of bending wood will appear in formula section in usual course.

250 E.B.B.F., Calcutta—Following is a formula of adhesive paste used for labelling on galvanised sheet:—Wheat flour 256 parts; Boric acid 2 parts; Nitric acid 3 parts; Glycerine 2 parts; Cold water 1280 parts. Mix the flower and boric acid with the water into a smooth paste, then stir in the glycerine then nitric acid, and slowly boil the whole until thick.

252 V.T.S., Aijal—You perhaps mean tobacco flavour which may be had of Ghose Bros., 50, Ezra Street, Calcutta.

253 R.S., Ballia—You may negotiate with the following firms:—Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road; Francis Klein & Co. Ltd., 1, Royal Exchange Place and Marshall Sons & Co., Ltd., 99, Netaji Subhas Road; all of Calcutta.

254 P.A.S., Madawachchi—Light ornaments are made from sheet metals by die stamping and cutting. It is not possible to make plates of China Clay by grinding and dusting broken plates of China Clay. You may use oil in moulds. Sand may be melted by applying heat whereas China Clay cannot be melted.

255 H.T.C., Bundi—It is not possible to manufacture soap by adding 4 mds. of silicate of soda in 1 md. oil. You may add 1 md. silicate in 1 md. oil. Process of manufacturing soap will be found in Manufacture of Soap published from this office, price Rs. 3-7 including postage.

256 S.K.P., Coimbatore—We do not deal in old stamps. You may however write to Bengal Stamp Co., 7, Hospital Road, Calcutta; Orient Stamp Co., Paharganj, New Delhi and Stamp Centre, 10, Chowringhee, Calcutta.

257 B.S., Delhi—Process of manufacturing fish glue, bakelite screw will appear in Formula section in due course.

258 S.M.S.B., New Delhi—Following is a list of potteries in W. Bengal:—Art & United Potteries, 9, Ezra Street, Calcutta; Bengal Potteries Ltd., 45, Tangra Road, Calcutta; Calcutta Potteries Ltd., 8, Lyons Range, Calcutta; India Potteries, 91, Dharamtala Street, Calcutta; Reliance Firebrick & Pottery Co., Ltd., 8, Clive Row, Calcutta; Uttarpara Pottery Works, 16-17, College Street, Calcutta; Central Pottery, Belgharia; Hindusthan Potteries Ltd., 105, Dharamtala Road, Lilooah, Howrah and Sodepur Potteries, Sukchar, 24-Parganas.

259 P.R., Agra Cantt.—We have no book on the manufacture of steampipe fittings.

260 T.S.P., Bombay—Process of lacquering tin in golden colour will appear in Formula section in due course.

261 C.L., Nigeria—We do not understand what you mean by real Madras. If you mean Madras snuff you may enquire of the following firms: A Jaimalabedden Saheb, 113, Mint St., Madras; Guru Basava & Co., Ltd., 1, Anumantarayan Street, Madras; K. S. Sahib Snuff Factory, 33-37, Muthu Naicken Street, G. T. Madras and P. V. Raja & Co., 44, Govindappa Naicken Street, Madras.

262 R.P.H., Guledgudd—Process of bleaching and sizing cotton yarn will be found in Cotton Dyeing and Printing published from this office, price Rs. 3-7 including postage. You may mix paraffin oil with eucalyptus oil.

264 F.S.M., Ahmedabad—Collapsible tubes may be had of Metal Box Co. of India Ltd., B-2, Hide Road, Kidderpur, Calcutta.

265 R.G., Coimbatore—Process of enamelling copper wire appeared in January 1950 issue of Industry.

266 S.K.M., Cuttack—Following is a list of tea merchants:—B. K. Saha & Bros. Ltd., 1, Pollock Street; Balmer Lawrie & Co., Ltd., 103,

[illegible] [illegible] Ltd., and Brooke Bond (India), [illegible] Mission Street, all of Calcutta.

270 S.E.P.W., Poona—It is not possible to chromium plate without chromium.

272 D.R.S., Talegaon Dabhade—We are not aware of any such engineering institute.

273 T.S., Ellore—We have many books on cottage industry. An article on small industries appears in April 1950 issue of Industry. For practical training on small industries you may write to P. C. Bhattachorjee, 16-1, Nandalal Bose Lane, Calcutta 3. For manufacturing ink you should use earthenware vessel or wooden vessel. It is not possible to manufacture fountain pen ink in tablet form.

275 R.S.S., Barabanki—Address of New York Medical College is not known.

279 K.C.I., Kakinada—For chemical analysis you may write to R. V. Briggs & Co., Ltd., 3 & 4, Garstin Place, Calcutta.

281 K.P.N., Bombay—Process of manufacturing orange squash and icecream will appear in Formula section in due course.

283 C.M., Bellary—For Chinagrass you may enquire of Banshidhar Dutt, 126, Khengrapatty Street, Calcutta.

285 S.P.T., Raipur—Wants to be put in touch with the exporters of antimony ore.

287 H.C.W., Jaipur City—For services of a chemist who can help you in manufacturing artificial gems and celluloid you should advertise in newspapers.

289 O.P.S., Rohtak Mandi—Casein is used as waterproof glue in plywood industry and match industry. For selling casein you should advertise in newspaper and in Industry.

291 H.R., Agra—A good formula of face powder appeared in February 1949 issue of Industry.

293 G.K., Trivandrum—Following is a formula of office paste: Distilled water 2 gallons, White dextrine 7½ lbs., White sugar 2 lbs; Powdered alum 7 oz.; Clove oil 1 oz; Carbolic acid 1 dr. Add alum and sugar to the water gradually stirring in the dextrine. Simmer until dissolved. Boiling always lessens the adhesiveness of dextrine, cool, stir in carbolic acid and oil of cloves.

294 M.P.Y., Palauk—Address of Indian Farm is "P" Block, Raisina Road, New Delhi. For incubator enquire of T. E. Thomson & Co., Ltd., 9, Esplanade East, Calcutta. For books on poultry farming enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta and W. Newman & Co., Ltd., 3, Old Court House Street, Calcutta.

295 O.N., Pathankot—You may negotiate with the following chambers of commerce:—Bengal Chamber of Commerce, Royal Exchange, Calcutta; Associated Chambers of Commerce of India, Royal Exchange, Calcutta; Bharat Chamber of Commerce, Imperial Bank Bldg., Barrabazar, Calcutta; Indian Merchants Chamber, Lalji Naranji Memorial, Indian Merchants Chamber Bldg., Back Bay Reclamation, Fort, Bombay, and Federation of Indian Chambers of Commerce and Industry, 28, Ferozeshah Road, New Delhi.

296 H.R.V., Ludhiana—An article on candle manufacture appeared in May 1949 issue of Industry. Plaster of Paris is usually manufactured from gypsum. For this purpose first grind the gypsum into powder in a disintegrator then pass it through 100-120 mesh screen. The fine powder thus obtained is heated to about 120°C. in an iron vessel and kept at this temperature for some time. During this period stir the material with a ladle.

299 P.P.R.V., Amritsar—For surgical dressing rolling machine enquire of W. H. Brady & Co., Ltd., Mercantile Bldg., Lall Bazar, Calcutta.

301 J.L.A., Jullundur Cantt.—It is not possible to manufacture fountain pen ink with three kinds of myrobolans and tauri. For manufacturing good fountain pen ink you have to use tannic acid and gallic acid. You should use either creosote or carbolic acid as preservative.

303 M.S., Cuttack—Reply to your query appears under No 3756 in March 1950 issue of Industry.

306 N.M., Kurnool—Rubber goods may be had of rubber stores, 44, Moti Sil Street; S. Abdul Rashid & Bros., 52-1, Canning Street; S. & H. Abdul Aziz, Abdul Khaliq, 44, 45, 46, Canning Street and Sarial & Co., 22, Canning Street, all of Calcutta.

307 A.C.S., Ajmer—For coconut essence enquire of Paradise Perfumery House, 7, Colootola Street, Calcutta.

308 P.N.S., Hardoi—Following is a formula of Jintan:—Menthol 160 gr.; sugar 10 oz.; liquorice 50 oz; otto of rose q.s.; musk 1 to 2 gr. First grind the liquorice into very fine powder and then mix it thoroughly with sugar in a stone mortar. Then add the menthol and make into small globules. Finally add the musk and otto of rose just sufficient to form a delightful odour. Next allow the pills to dry otherwise they will shrink away from the coating and leave it a shell easily crushed off. When dry, take starch, gum arabic and white sugar equal parts rubbing them very fine in a stone mortar, and if damp drop up the substances first before they are rubbed together. Then mix with it a few grains of cochineal or any other harmless colour to impart a pink colour to the mixture and transfer the whole into a suitable box for shaking. Now put a few pills into a small tin box having a cover and pour on them just a little syrup shaking well to moisten the surface only. Then introduce into a box of powder, and keep in motion until completely coated, dry and smooth.

309 R.M.G., Dangsapara—We are not aware of any such University that gives degree by correspondence course.

310 G.S.S., Jullundur City—Celluloid [illegible] is soluble in amylacetate and acetone but [illegible]

[illegible] Wants [illegible] [illegible] and [illegible] cement. For fixing plastic on [illegible] you may use celluloid cement.

313 S.G., Calcutta—It is not possible to manufacture calcium carbide with Rs. 5,000 to Rs. 15,000. Process of manufacturing calcium carbide will appear in Formula section in due course.

315 V.S.N., Salem—Soak the tobacco leaves in rose water, then pack in the cans.

317 R.K.M., Karur—For the oil required enquire of Burma Shell Oil Storage & Distributing Co., Ltd., Hongkong House, Dalhousie Sqr., Calcutta.

318 V.B.T.C., Jaipur—For Chinese bristles enquire of K. L. Mehta & Co, Kanpur; Narayansamy, Patkapur, Kanpur and Hind Bristle Co., Mulbery House, Agra.

320 N.F.C., Bombay—Quantity of starch obtained from germinated wheat will be much less. Process of manufacturing starch from wheat will appear in Formula section in due course.

322 R R E L, Bhimavaram—For printed capsule you may enquire of Mukerjee & Sons, 3, Ezra Street, Calcutta and Bharat Laxmi Press, 92, Princess Street, Bombay 2.

325 R P.H., Guledgud—We are not aware of turika oil or turkot oil. You may write to Imperial Chemical Industries (India), Ltd., 18, Strand Road, Calcutta.

326 T.K.P., Madura—For cast iron and pig iron pans enquire of Lachmi Hardware Stores, 418, Monohardas Chowk; Kumar & Co., Ltd., 21, Maharshi Debendra Road; J. N. Laha & Co., 443, Monohardas Chowk and P. Ghose & Co., 38, Strand Road; all of Calcutta.

327 B N.S., Singhbhum—Addresses of coal mines of Ranigunge, Jharia, etc. will be found in Industry Year Book & Directory published from this office, price Rs. 16-4 including postage. Addresses of timber merchants will also be found in the above book. Your previous letter is not traceable.

328 L.N T. Gwalior—Recipes of ointments for eczema, itches, ringworm, etc. will be found in Pharmaceutical Preparations published from this office, price Rs. 3-7 including postage

329 S.H.J., Farrukhabad—We have no book on mango parchment manufacture. After extracting the juice it should be strained through fine linen. Pour in plates of glass or porcelain and dry by means of steam.

330 S.C., Banaras City—For thread balling or tubing machine enquire of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta and W. H. Brady & Co., Mercantile Bldg., Lall Bazar, Calcutta. For thread enquire of [illegible] Thread Co., [illegible] Street; Banwarilal [illegible], [illegible] Street and Indian Yarn Trading Co., [illegible], Cotton Street; all of Calcutta. For [illegible] tubes write to Gogate Paper Box Works, Princess Street, Bombay and Central Paper Box Factory, Patel Bldg., 250, Nagdevi Street, Bombay.

332 E.T.C., Trichinopoly—Formulas you require will appear in due course.

333 H.D.A., Ranchi—Wants to be put in touch with the suppliers of forms for rubber baloons.

334 G.C.R.R., Agra—We have no directory of America. You may enquire of American Trade Commissioner, 9-10, Esplanade Mansion, Calcutta.

335 A.V.K., Nellore—Process of manufacturing distilled water appeared in October 19[illegible] issue of Industry.

336 V N.S., Rajkot—We are not aware of any institute where gilding and silverplating are taught.

337 S.S.M., Ajmer—Process of hydrogenation will be found in Vegetable Oil Industry published from this office, price Rs. 3-7 including postage. China grass is a natural product. Process of manufacturing record colouring films will appear in due course.

338 D.E.F., Madras—For vermicelli making machine write to Oriental Machinery Supplying Agency Ltd, P-12, Mission Row Extension, Calcutta.

339 H S.F., Nasik—For gunny bags you may enquire of Adhikary & Co., 21A, Canning Street and Pioneer Bag Co., 15, Netaji Subhas Road; both of Calcutta.

341 G. C. C., Howrah—For snuff enquire of Sinclair Robert Tobacco Co. Ltd., Newcastle on-Tyne and Illingworths Snuffs Ltd., Kendal, both of England. Following is a list of analytical chemists:- Harry J., Campbell & Co., 16, Cathedral Road, Cardiff; J. & H. S. Patkinson, 10, Dean St., Newcastle-on-Tyne and Johnson Matthey & Co, Ltd., 73-83, Hatton Garden Lane, London E.C.1.

343 R. S. S., Yeotmal—Following is a list of gramophone record manufacturers:—Gramophone Co. Ltd., 33, Jessore Road, Dum Dum, Near Calcutta; Hindusthan Musical Products Ltd., 6-1, Akrur Dutta Lane, Calcutta; National Gramphone Record Mfg. Co, Ltd., 110, Meadow Street, Bombay; Twin Record Co., Ltd., 33, Jessore Road, Dum Dum and Viel-o-Phone Co., Mahim, Bombay.

344 M S.S., Pedevege—An article on soap manufacture appears in April 1950 issue of Industry.

345 P.B.R., Jullundur Cantt.—For synthetic resin and natural waxes enquire of Calcutta

[illegible] Co., Ltd., 10, Bonfield Lane and [illegible] [illegible], 125, Khengrapatty Street; both of Calcutta.

348 M.R., Lohardaga—We cannot understand the terms mentioned by you.

349 C. L. S., Amritasar—For oil expeller you may write to Mirrlees Watson & Co. Ltd., Grosvenor House, 21, Old Court House Street, Calcutta and Marshall Sons & Co., Ltd., 99, Netaji Subhas Road, Calcutta. Process of extracting oil will be found in Vegetable Oil Industry published from this office, price Rs. 3-7 including postage.

350 S.A.H.Q., Kanpur—We have no book explaining chemical formulas.

353 S.V.S.I., Bangalore—For bottle making machines enquire of Francis Klein & Co., Ltd., 1, Royal Exchange Place, Calcutta.

356 P.K.D.C., Sylhet—For learning soap making you may write to P. C. Bhattacherjee, 15d, Nanda Lal Bose Lane, Calcutta 3.

357 A.M.M., Cochin—For tin printing machine enquire of John Dickinson & Co., 6, Clive Row, Calcutta. Following is a list of tin printers: Bengal Tin Box Mfg. Co., Ltd., 1, Jadu Nath Mitter Lane, Calcutta 4; Bombay Tin Printers, 221-23, Thakurdwar Road, Bombay 2; Colour Printing & Hollowware Works, Ltd., 243, Upper Circular Road, Calcutta; Metal Decorating & Shaping Co., Ltd., 24, Prince Anwarshah Road, Calcutta; National Sheet & Metal Works Ltd., 36A, Sahitya Parishad St., Calcutta; and Tin Printing Works, Kutch Road, Arrah, Shahabad.

359 P.C., Siranj—Pin and paper clip making machines are not available in India at present.

365 B.L.C., New Delhi—Process of manufacturing pencils will be found in Industry Prize Article I published from this office, price Re. 1-15 including postage.

366 J.D.D.R., Ludhiana—We have no book dealing with celluloid goods. For machines enquire of Francis Klein & Co., Ltd., 1, Royal Exchange Place, Calcutta. For books you may enquire of Thacker Spink & Co. (1933), Ltd., 3, Esplanade East, Calcutta and W. Newman & Co., Ltd., 3 & 4, Old Court House Street, Calcutta.

375 V.V.R.R., Guntur—German addresses are not available at present. As regards addresses of Switzerland write to Swiss Trade Commissioner for India, Burma and Ceylon, Gresham Assurance House, Sir P. Mehta Road, Bombay and for address of France write to French Trade Commissioner, 13, Park Mansions, Park Street, Calcutta.

378 J.J.C., Vijayawada—Process of manufacturing casein toys and artificial stone will appear in Formula section in due course.



382 K.S., Darbhanga—[illegible] raw materials may be had of Rajaram & Co., 37, Grant Street, Calcutta and Essence & [illegible] Supply Agency, 14, Radha Bazar Street, Calcutta.

383 B.F.C., Barnagore—Process of dehydrating vegetables will appear in Formula section in due course.

385 K.J.F., Thiruthangal—Following is a list of match factories: Calcutta Match Industry Works, 14-22, Canal East Road, Calcutta; Esavi India Match Mfg., Co., 47, Muraripukur Road, Calcutta; Amrit Match Factory, Kargi Road, Bilaspur; Madras Match Works Ltd., 42, Gollawar Agraharam Road, Tondiarpet, Madras and Kanpur Match Works, Kanpur. Following is a list of printing presses: Model Press, Bura Bastion Road, Delhi; Lahore Art Press, 6, Deputy Ganj, Delhi; Gupta Printing Works, 298, Esplanade Road, Delhi; Agarwal Press, 21, Sheo Charan Lal Road, Allahabad; Central Press Ltd., Ramnarain Bazar, Kanpur and Fine Art Press, Johri Bazar, Agra.

387 N.V.S., Bhainsdehi—For soap and lipstick moulds write to Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

389 S.O.C.I., Madras—For celluloid sheets you may enquire of Majid & Co., Karim Bldg., Corner of Mohamedally Road and Musjid Bunder Road, Bombay and Dutt & Co., 16-B, Golock Dutt Lane, Calcutta. Amylacetate, butylacetate, etc. may be had of Calcutta Chemical Co., Ltd., 10, Bonfield Lane, Calcutta.

393 M.T.S., Nigeria—For textiles write to Bombay Textile Supply Co., Mehta Bldg., Meadows Street, Bombay; Hind Textile Trading Co., Advani Chambers, Sir P. Mehta Road, Bombay; Indian Textile Co., Taj Mahal Hotel, Apollo Bunder, Bombay and Kumar Textiles, Lentin Chambers, Dalal Street, Bombay. For matches enquire of Western India Match Co., Ltd., Ambarnath, Near Bombay and Calcutta Match Industrial Works, 14-22, Canal East Road, Calcutta. Other address you require will be found in Industry Year Book & Directory published from this office, price Rs. 16-4 including postage.

397 B.B.O., Sasaram—You may consult Indian Textile Journal, Surya Mahal, Military Square, Fort, Bombay; Industrial Gazette, Burman Street, Calcutta.

398 M.B., Tuticorin—For Manilla powder and milk powder enquire of Rajaram & Co., 37, Grant Street, Calcutta.

400 A.H.K., Palanpur—For selling tooth powder you should appoint agents and distributors in important towns and also advertise in newspaper. Chemical dictionary is not available.

401 E.C., Kanpur—For ice candy-making plants enquire of Refrigerators (India), Ltd., 59C, Park Street; M. S. Vernal & Co., Bharat Insurance Bldg., Chittaranjan Avenue South, Calcutta; F. & C. Osler Ltd., 12, Old Court House Street, Calcutta and Air Conditioning Corporation Ltd., 13, Lee Street, Calcutta.

403 F.B., Calcutta—A good formula of [illegible] alta appeared in April 1950 issue of Industry.

405 R.V.G., Amadalasa—In order to prepare thymol from ajowan seeds take a [illegible]

[illegible] A fairly [illegible] put into the vessel [illegible] and a quantity of water is then poured to cover the seeds just immersed in it. On heating the oil of thyme is distilled over. It is condensed and collected in a receptacle placed in the further end of the condenser. The oil is then separated from water by decanting the upper layer. Thymol is isolated from this volatile oil by shaking the latter with an equal volume of warm sodium hydroxide (sp. gr. 1.33) and after several hours the mixture is diluted with 2-3 volumes of hot water. The aqueous portion which contains the thymol in solution in the form of its sodium salt, is separated and acidified. The precipitated thymol is dried and rectified by distillation. The fraction which distils at 230°—235°C. is seeded with a crystal of pure thymol and set aside in a cold place. The crystallised thymol is separated by filtration and purified by recrystallisation from petrol.

407 P.L.S.C., Bulandshahr—Wants to be put in touch with the manufacturers of guns, clearing implements and cartidge re-loading machines. For books you may enquire of Thacker Spink & Co. (1933), Ltd., 3, Esplanade East, Calcutta. Following is a list of booksellers: W. & G. Foyle Ltd., 119-125, Charing Cross Road, London W.C.2 and Jarkson William (Cooks), Ltd., 18, Took's Court. Chancery Lane, London E.C.4.

408 R.G., Burhanpur—Following is a formula of chalk crayons. Precipitated chalk 40 parts, plaster of Paris 45 parts; lithopone 10 parts, glue solution 5.10 parts. Knead all together to make a soft dough and pour into gun metal mould. When set take out and allow to dry in air. Then put all together in a tray and moderately bake over mild fire. For moulds enquire of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

409 A.R., Jodhpur—For canvas shoes enquire of Central Rubber Works Ltd., 20B, New Tangra Road, Calcutta; Gold Mohur Rubber Works, *Jogmohandas Bldgs.*, 386, *Girgaum Rd.*, Bombay and Bhattacharya Rubber Works, 194, Jessore Road, Dum Dum, Calcutta. For toys enquire *of* Bepin Behary Dass & Grandson, 63, Radha Bazar Strtet, Calcutta; Doll Dummy & Toy Manufacturing Co., 27, South End Park, Ballygunge, Calcutta.

410 S.N.D., Calcutta—Process of manufacturing nitrocellulose will appear in Formula section in due course.

411 D.S., Bassi Pathanam—There is no arrangement for giving training on catchet and capsule making. For machines you may enquire of Oriental Machinery Supplying Agency Ltd., P-12, *Mission Row Extension*, Calcutta.

412 T.U., Surat—Refer your query to Thacker Spink & Co. (1933), Ltd., 3, Esplanade East, Calcutta and International Book House Ltd., Ash Lane, Opp. Clock Tower, Fort, Bombay.

415 .N.R.R.L.A., Coondapoor—Regret we cannot comply to your request.

418 B.C.N., Bhadrak—All sorts of paper may be had of Bholanath Paper House Ltd., Kusum [illegible], 21, Beadon Street and Mukherjee Dutt & Co., 21, Jackson Lane; both of Calcutta.

[illegible] Co., Ltd., 21, Jackson Lane, Calcutta. [illegible] should use potassium carbonate and sodium silicate which may be had of the above firm. For preparing putty you should make a paste with linseed oil and whiting.

423 N.G.C., Howrah—We have no book on radio set making. You may enquire of Thacker Spink & Co. (1933), Ltd., 3, Esplanade East, Calcutta.

424 J.S.W., Coimbatore—Following is a recipe of pimple lotion: Crystallised alum [illegible] sugar candy 2 oz.; spermaceti 2 oz.; elder[illegible] water 3 oz.; benzoated lard 4 oz.; distilled water 3 oz. Reduce all the solids into fine powder and rub up with the mixed liquids. This lotion is to be applied at intervals during the day upon linen rags, which should frequently be changed. It is an effectual and quick remedy for eruptions on the face.

425 S.L.N., Kottavalasa—We have no book on mica mining. Following is a list of mica dealers: Premier Mica Mining & Mfg. Co., [illegible], Gopi Kristo Pal Lane; Calcutta Mica Corporation, 161, Muktaram Babu Street, and Indian Mica Supply Co., Ltd., 95, Lower Chitpur Road; all of Calcutta.

428 D.C, Ballia—Following is a list of stationery article dealers: Royal Stationery Supply House, 5, Jackson Lane; Ruth & Co., 11, Dalhousie Square East; W. Newman & Co., Ltd., 3, Old Court House Street and Nilmony Haldar & Co., Chittaranjan Avenue; all of Calcutta.

430 C.A.R., Kakinada—You may consult Manure and Its Application published from this office.

433 R.K.M.S., Cawnpore—Following is a formula of soap powder: Hard yellow soap [illegible] parts; soda crystals 3 parts; pearl ash 1½ parts; sulphate of soda 1½ parts; palm oil 1 part. Mix the ingredients in a specially adopted mixer for heavy material until dry and then run directly to the crusher and pulveriser.

434 G.M.L., Secunderabad—For nuts, bolts, etc., enquire of Army Engineering Corporation, 43, Strand Road; Bolt Nut House, 71-A, Netaji Subhas Road; Tosh Iron Works, 37, Chetla Road, and P. C *Choudhury & Sons*, 97, *Netaji Subhas* Subhas Road; all of Calcutta.

[illegible], Delhi—For an expert you should [illegible] newspapers. For special kind of [illegible] may enquire of Tata Iron & Steel Co., [illegible] 100-A, Netaji Subhas Road, Calcutta; Steel [illegible] of Bengal Ltd., 12, Mission Row, [illegible] and Thermic Steel Co., Ltd., C5, Clive [illegible], 8, Netaji Subhas Road, Calcutta.

441 R.R.S., Sehore—Bottles may be had of Sodepur Glass Works, Sodepur, 24-Parganas; [illegible] Gobindeo Glass Works; Ramrajatola, Howrah and Bharat Glass Works Ltd., Belgharia, W. Bengal.

443 S.H.S.M., Motihari—If you go through April 1950 issue of Industry you will get all information regarding small industries.

446 S.L.D., Jamnagar—For addresses of U. K. write to British Trade Commissioner, 1, Harington Street, Calcutta and for American addresses write to American Trade Commissioner, 9-10, Esplanade Mansion, Calcutta. Following is a list of plastic goods dealers Abdul Kayum Haufally & Bros., 193, Abdul Rehman Street, Bombay; Mysore Airmec Ltd., Bangalore; Plastics Moulders Ltd, 38, Netaji Subhas Road, Calcutta and Mutek (India). Ltd., Devkaran Mansion, Princess Street, Bimbay 2.

447 E.R.S., Jog Falls—You may start mail order business which is lucrative. You have to print circulars, illustrated catalogues, etc. and send them through post when you will get responses.

449 T.S.B.R., Patiala—For platinum wire enquire of Hamilton & Co., Ltd., 8, Old Court House Street, Calcutta. For almond oil extracting machine you may enquire of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta For gas plant write to Bengal Chemical & Pharmaceutical Works Ltd., 164, Manicktala Main Road, Calcutta.

450 S.S.B.S., Jubbulpore Cantt—You may consult Cotton Dyeing & Printing published from this office, price Rs. 3-7 including postage

453 G H D., Raipur—You may consult Indian Perfumes, Essences and Hair Oils published from this office, price Rs. 3-7 including postage.

455 K.C., Kanpur—Process of manufacturing liquid gold will appear in Formula section in due course.

456 S.K.S., Saugore—Perfumery raw materials may be had of F. N. Sarkar, 37, Canning Street and Ghose Bros., 50, Ezra Street; both of Calcutta.

458 P.S., Mandsaur—You may consult Electroplating in Practice published from this office, price Rs. 3-7 including postage. We have no book on optical line.

460 V.P.P., Colombo—Process of mirror making will be found in Independent Careers for the Young published from this office, price Rs 3-7 including postage.

461 S.K.B., Gauhati—[illegible] rubber balloons will be found in [illegible] Rubber Goods published from this office, price Rs. 3-7 including postage. An article on [illegible] manufacture will be found in April 1950 issue of Industry.

462 O.P.M., Moga—Button making machines may be had of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta. You may consult Industry Year Book and Directory published from this office, price Rs 16-4 including postage.

463 S.S., Colombo—Formulas of ink, soap, etc., will be found in April 1950 issue of Industry; other formulas will appear in Formula section in due course.

464 N S, Delhi—Process of manufacturing drycell and storage batteries will be found in Manufacture of Batteries published from this office, price Rs. 3-7 including postage.

465 B C D.S, Calcutta—For timber write to A C Chumar & Son, Ollur, Cochin and K. B. Thomas, Pullupalam Canal Road, Cochin.

466 N S, Surat—Your enquiry is in the nature of an advertisement; so this cannot be published in Trade Enquiry columns free of charge Refer your other queries to Thacker Spink & Co. (1933), Ltd., 3, Esplanade East, Calcutta and International Book House, Ash Lane, Opp Tower Clock, Bombay

467 S V, Lucknow—Formulas and recipes you require will appear in Formula section in due course.

468 S V, Lucknow—All the chemicals you require may be had of Calcutta Chemical Co, Ltd, 10, Bonfield Lane; Calcutta Mineral Supply Co, Ltd, 31, Jackson Lane, and Banshidhar Dutt, 126, Khengrapatty Street. all of Calcutta.

471 J R, Simla—Eggs are sold at cheap rate in E Pakistan.

472 O P K., Simla—There is no arrangement for teaching beekeeping practically. Shellac wax may be had of Banshidhar Dutt, 126, Khengrapatty Street, Calcutta. Nigrosine, bismark brown may be had of Champalal Agarwala, 45, Armenian Street, Calcutta. You may start a dairy farm at Simla.

473 S.H A.S.A C., Sukkur—Process of manufacturing Turkey red oil will appear in Formula section in due course.

474 A.R.M., Dubrajpur—Soap materials may be had of Calcutta Mineral Supply Co., Ltd., 31, Jackson Lane, Calcutta Process of manufacturing washing soap appeared in April, 1950 issue of Industry.

475 S.S., Amritsar—Collapsible tubes may be had of Metal Box Co of India, Ltd., B-2, Hide Road, Kidderpore, Calcutta.

476 G.S N., Kakinada—Talcum powder is not used in toilet soap If you use 50 p.c. filling agent quality of the soap will deteriorate. Gypsum, china clay, etc., may be had of Calcutta Mineral Supply Co., Ltd., 31, Jackson Lane, Calcutta. You may use verdigris for making crayons of green colour. Manufacture of ultramarin blue and Chinese blue has been taken up in India.

477 S.B., Delhi—Collapsible tubes may be had of Metal Box Co. of India Ltd., B-2, Hide Road, Kidderpore, Calcutta.

[illegible] — All the chemicals you require are not available. You have to manufacture those chemicals yourself.

485 S.P., Vizianagram—For ointment boxes enquire of Topall Works, Lucknow and Manorama Plastic and Chemical Works, 35A, Talpukur Road, Belliaghata, Calcutta.

486 R.K.S., Agra Cantt.—Process of enamelling copper wire will be found in April 1949 issue of Industry.

487 D.S.L., Akola—For machines of different kinds enquire of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta.

488 H.R., Agra—Refer your query to the Special Paper Officer of your province.

491 D.R.S, Poona—Process of manufacturing ink will be found in April 1950 issue of Industry. Process of manufacturing safety pins will be found in Mechanical Industries published from this office, price Rs. 3-7 including postage.

494 T.G.B, Mandra—Mercury may be solidified by *amalgam with most metals. It unites* directly and readily, either cold or hot with potassium, sodium, barium, strontium, calcium, magnesium, zinc, cadmium, tin, antimony, lead, bismuth, silver and gold

495 J F.I, Ragama—Formulas of writing and fountain pen ink will be found in April, 1950 issue of Industry

496 H C P C, Mathura—It is not possible to manufacture caustic soda from sodium sulphate directly. Process of manufacturing caustic soda from reh will appear in Formula section in due course.

500 N M S, Barabanki—For raw materials for phenyle write to Calcutta Mineral Supply Co, Ltd., 31, Jackson Lane, Calcutta.

504 V L.B, Hospet—Ice making machines may be had of M S Vernal & Co, Bharat Insurance *Bldg, Chittaranjan Avenue, Calcutta* and Masseys (India), Ltd., Royapuram, Madras The above firms will supply you catalogues and other literature required.

505 P.L.A, Jhansi—Process of manufacturing black salt will appear in Formula section in due course.

508 K C J, Trichur—Following is a list of crude drug dealers P. C. Dawn & Co, 1, Mechua Bazar Street; Banshidhar Dutt, 126, Khengrapatty Street and Indian Herbs Store, 31, Mullick Street; all of Calcutta.

511 S.S, Akola—Safety pin making machines are not available in India at present For other machines you may enquire of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta.

512 K.S.K., [illegible]—Confectionery making raw materials may be had of [illegible] & Co., [illegible] Grant Street, Calcutta and [illegible] & [illegible] Supply Agency, 18, Radha Bazar Street, Calcutta. You may use cornflour in place of wheat flour.

513 A.R., Nagpur—You may write to British Trade Commissioner, 1, Harrington Street, Calcutta.

514 M D.C, Bhadravati—For Laundry machine enquire of Jessop & Co., 93, Netaji Subhas Road, Calcutta.

515 A.M M., Bombay—Process of manufacturing salammoniac will be found in Chemical Industry of India published from this office, price Rs. 3-7 including postage. Process of refining oils will be found in Vegetable Oil Industry published from this office, price Rs. [illegible] including postage.

516 M M J, Gujranwala—A formula of pasting solution will appear in Formula section in due course

519 R K.R, *Tiruchirappalli—For Crude* and Diesel oil engines enquire of Balmer Lawrie & Co., Ltd., 103, Netaji Subhas Road, Calcutta and Francis Klein & Co, Ltd., 1, Royal Exchange Place, Calcutta

522 S K.N, Akola—Following is a list of vegetable product manufacturers: Amrit Banaspati Co, Ltd, Ghaziabad, U.P; Bharat Vegetable Products Ltd, Chatrapur, Ganjam, Ganesh Flour Mills Ltd, Delhi, Hindusthan Vanaspati Manufacturing Co, Ltd Ballard Estate, Bombay; Indian Vegetable Products Ltd, Inc. Connaught Cross Road & Ready Road, Bombay; Modi Vanaspati Mfg Co, Modinagar U P.; Mysore Vegetable Oil Products Ltd, 17, Cochrane Basin Road Madras and Snowwhite Food Products Co, Ltd., Howrah.

525 S K T I, Gandhinagar—Following is a list of toy manufacturers Delhi Toy Works, 168, Chandni Chowk, Delhi; Fancy Toy Works, outside Dariba Kalan, Delhi; Sapru Prasad & Co., 51, Aminabad Park, Lucknow and Swamy Toy Works Gwalior

531 S K V., Patna City—Plastic machines may be had of Fancis Klein & Co., Ltd., 1, Royal Exchange Place, Calcutta.

532 B K S S S, Amritsar—Process of manufacturing particular brand of soap such as sunlight soap, Lux soap is not available. Process of manufacturing similar soap will appear in Formula section in due course

533 Y T., Kanpur—For pin, clip making machines write to Baird Machinery Co., Bridgeport, Connecticut, U.S A These machines are not available in India at present

[illegible] [illegible], [illegible]—For weaving machines [illegible] of W. H. Brady & Co., Ltd., Mercantile [illegible], Lall Bazar, Calcutta.

[illegible] R.L.R M., Bombay—A recipe of scented [illegible] appeared in February 1950 issue of Industry. Following is a formula of Jintan: [illegible] 160 gr.; sugar 10 os.; liquorice 50 oz; [illegible] of rose Q S.; musk 1 to 2 gr First grind the liquorice into very fine powder and then [illegible] it thoroughly with sugar in a stone mortar [illegible] add the menthol and make into small [illegible] Finally add the musk and otto of rose [illegible] sufficient to form a delightful odour.

537 N.J.J., Naga Hills—For slate cutting and filing machine enquire of Marshall Sons & Co., Ltd., 99, Netaji Subhas Road and Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, both of Calcutta.

538 V.M.P., Dhari—To convert inferior sugar including the second sugar into refined crystalline white sugar, it is boiled with water and the syrup in classified with milk till a perfectly clear syrup is obtained When ready to crystallise the syrup is thinner than that of the cane juice rab and the state is easily determined by the experienced eye of the boiler. The hot liquid is transferred into a round iron pan in which it is sired in order to favour crystallisation; as soon as the fine crystals become visible the mass is transferred to suitable vessels to cool and crystallise further. After two or three days to crystallise the material is ready to be treated in the centrifugal when crystallised sugar will be obtained

539 G.S., Cuddappah—You may start soap manufacture with small capital. Process of soap manufacture will be found in April 1950 issue of Industry. If you go through the article you will get all the information required.

540 B.G., Calcutta—For books on salt industry and its bye-products enquire of Thacker Spink & Co. (1933), Ltd, 3, Esplanade East Calcutta and W. Newman & Co, Ltd, 3, Old Court House Street, Calcutta

542 M.T.E., Raipur—For selling photo frames you should advertise widely Process of varnish making will be found in Prospective Industries published from this office, price Rs. 3-7 including postage

543 S D, Illegible—Please write in English

544 B, Calcutta—You may go through Plastic Industry published from this office, price Re. 1.

546 N., Amritsar—For Asbestos enquire of A. & N. Banerjee Co., 84A, Netaji Subhas Road [illegible] B. Chatterjee & Co., 40, Strand Road and [illegible] Company Ltd., 20, Belvedere Road; all of Calcutta.

547 A. S. C., Erode—[illegible] enquire of Majid & Co., [illegible] of Mahamedally Road & Musjid Bunder Road, Bombay and Swadeshi Industries Ltd., [illegible], Netaji Subhas Road, Calcutta.

548 R. P., Vizagapatam—You may consult Electroplating in Practice published from this office, price Rs. 3-7 including postage.

549 V. S. R., Coimbatore—An article on candle manufacture will be found in April 1950 issue of Industry. Candle making machine may be had of Oriental Machine Supplying Agency Ltd., P12, Mission Row Extension, and Small Machineries Mfg, Co., 22, R. G. Kar Road; both of Calcutta.

550 M. S., Cuttack—Thank you for your suggestion Process of manufacturing coffee will appear in due course.

551 R P., Kasganj—Ink and boot polish making ingredients may be had of Banshidhar Dutt, 126, Khengrapatty Street, Calcutta and Champalal Agarwala, 45, Armenian Street, Calcutta.

554 A. V. R C., Tuticorin—For bucket making machine you may enquire of Alfred Herbert (India) Ltd., 13/3, Strand Road, Calcutta Process of galvanising will be found in Electroplating in Practice published from this office, price Rs 3 7 including postage.

555 C E.C S, Coimbatore—For jute mill machineries write to McLeod & Co Ltd., 28, Dalhousie Square, Calcutta. For straw board making machines enquire of Francis Klein & Co Ltd, 1, Royal Exchange Place, Calcutta. We have no book on jute industry and strawboard manufacture You may however enquire of Thacker Spink & Co (1933) Ltd., 3, Esplanade East Calcutta for the books required.

556 K. J. R., Kurnool—Your letter is receiving our attention.

557 G. P. V Champaran—Please write in English.

558 A J M, Cochin—For securing services of a tile expert advertise in newspaper. We have no book on tile making

564 R. C. W, Gorakhpur—Hard paraffin is the cheapest raw materials used for manufacturing candles An article on candle manufacture will be found in April 1950 issue of Industry.

566 G T C, Lucknow—Following is a list of trade mark agents: De Penning & De Penning, 10, Govt Place East and L. S. Davar & Co., Norton Bldg.; both of Calcutta.

REVIEW OF BOOKS

THE EASTERN ECONOMIST, 1949 Annual Number. Published at the Hindusthan Times Press, 22, Queensway, New Delhi. Price, Rs. 3/-.

This issue of Delhi's famous trade journal, "The Eastern Economist" is packed with detailed information relating to India's economic development during the last fifty years. The study is severely objective being full of facts and figures. Between its two covers there are materials which give a comprehensive idea of where we stand to-day in regard to food, agriculture and industry. Other allied subjects like labour problems, trade, transport, public finance, etc., are fully dealt with.

It is a fact that the present economic situation in our country is not altogether happy. But there are signs available to-day which definitely indicate that we are gradually turning round the corner. The Eastern Economist mentions the following developments as a good omen: decision to end the extravagance in foreign exchange, food self-sufficiency drive and efforts to grow the country's own requirements of jute and cotton. In the international field we have moved perceptibly towards the outpost of the democratic world and the World Bank granted a dollar loan to India for the first time in 1949.

Dealing with devaluation, the most important single decision of last year, the journal makes a very balanced estimate of its advantages and disadvantages. As an incentive to our exports and because of our link with the sterling bloc as far as our export-import trade is concerned, devaluation is rightly assessed to have been a necessity. But its disadvantages too are now being felt. Take, for instance, the fact that two of our industries, namely, Jute and Cotton are faced with raw material problems. Even so, we are leaving no stone unturned to attain self-sufficiency in Jute and Cotton. Of course, that cannot be done overnight. Yet it is a good augury for our future that we are making efforts to eliminate our dependence on raw cotton and jute imports from outside.

The journal contains graphs and statistical tables relating to production, income and wages and it will serve as a valuable book of reference for economists, businessmen and students.

HANDBOOK OF TEXTILE INDUSTRY, 1949. Published by Bureau of Economic Research, P. O. Box No. 45. Kanpur, (U. P.) Pages, 430, price Rs. 15/-.

The book can well go down as a mine of information relating to the various branches of textile industry in this country like Jute, Cotton, Handloom, Woollen and other forms of textile industries. The contents include brief but knowledgeable reviews of the textile centres in India and Pakistan with all available statistical details regarding equipment, labour employed, efficiency and production, women labour, working hours, wages, service conditions, etc.

For those engaged in the textile trade as well as those who hold shares in the various textile concerns the book will serve admirably the purpose of reference. It contains much valuable information on the textile mill shares and the working of the stock markets in Bombay, Calcutta and Madras. The chapter on technical and technological institutions gives details which will prove very useful to students who would like to take up a career in the textile line.

With its "Who's Who" section and a number of other chapters on the financial, technological, mechanical, organisational and various other aspects of the cotton, jute, silk, woollen and many other such textile industries, this work really deserves a place on the bookshelf of all those who are interested in this country's industrial development. For those who would not directly participate in the task but need information to be able to comment intelligently on what is taking place on the economic front,—we mean economists, journalists and public men,—this handbook will serve as an excellent book of reference.

A HANDBOOK OF MALARIA CONTROL by R. Svensson, D.S.O., M.C., M.B., R.A.M.C., Published by The Shell Group of Oil Companies. Pages, 74, price, not mentioned.

In eleven short chapters the book explains the nature of the dangerous tropical disease, malaria and the various methods of controlling the pestilence which have proved effective. The writer is of the opinion that the control of malaria on a large scale is not "an airy dream but a matter of practical politics." He adds in this connexion. "It is becoming increasingly evident that an attitude of passive acceptance of malaria as a necessary evil is

...ods and should be replaced by an active ... the problem on the part of the whole ... unity, for only by co-operation of the ... can a medical department achieve the best results." The author goes on to say, "In many regions the bulk of the malaria is man-made, faulty engineering with obstruction to drainage, the multiplication, for various purposes, of borrow pits and artificial pools are among the frequent sins of ignorance that only co-operation can prevent." The engineer should therefore, act in close co-operation with the malariologist and as Sir Malcolm Watson, who writes a foreword to the book under notice says, "engineering which leaves a trail of malaria behind it is bad engineering."

The various methods of control dealt with in this book are (1) the natural methods; (2) regulation of water flow or level; (3) draining; and (4) oiling. All necessary details of these preventive methods are given in the work. The use of anti-malarial oil has proved of incalculable value in combating the disease in Malaya.

Apart from the humanitarian consideration, the scourge of malaria needs to be wiped out in the interest of unhampered industrial and economic development of a particular region. The oil called Malariol which is used for killing the mosquito larvae, is a mixture of petroleum oils. According to the author, "Oiling has the disadvantage of being harmful to crops but, apart from this restriction, it has a very wide sphere of utility. It avoids heavy expenditure on sub-soil drainage schemes; and it is particularly applicable to the many regions where control is only necessary for part of the year.

NOTICES & REVIEWS

(Manufacturers sending specimens and samples of their products for notice and review may please note that no notice is published of medical preparation and allied substances in this section.)

READY RECKONER

We have received a copy of Madan Ready Reckoner by Tej Bhan Madan containing calculation tables of salary or rent for one to thirty days in 28 to 31 days' month. It is published by the author from 108/182, Rambagh, Kanpur.

INDIAN FOREST LEAFLETS

We are glad to receive two Indian Forest Leaflets Nos. 110 and 111 dealing with investigations undertaken by the Institute on the possibilities of making boards from wood shavings and saw dust and a preliminary note on adhesives from cashew-nut shell oil. These leaflets have been published by Forest Research Institute, Dehra Dun, U. P.

Mr. H. DHARA PASSES AWAY

We regret to announce the death of Mr. H. Dhara, once our valued colleague, at Chirimiri at the age of 78. He was long connected with us and besides writing several books on journalism for our publication contributed to the columns of Industry. For some time he was the editor of the Success Journal "Work and Wealth." Journalism was a great passion with him, and he entered the arena of free lancing, sacrificing a lucrative Government job, at a time when it hardly offered living remuneration to its votaries. A fluent writer of outstanding merit on varied aspects of life and activities he was well known among all sections of journalists and his writings appeared in almost all the leading newspapers and magazines in India. It may be said without the least hesitation that he was one of the ablest exponent of classic English and his books "Journalism," "Free Lance," "Advertising To Sell" bear the stamp of a refreshing style that baffles imitation. Mr. Dhara was, above all, a perfect gentleman of high culture and had no foe. May his soul rest in peace!

TRADE ENQUIRIES

(To communicate with any party write to him direct with name and address given below mentioning Industry).

38 Geetha Home Industries, Hanuman Temple Plot, Berhampur, Ganjam—Want to be put in touch with the suppliers of Bostitch machines.

51 Dr. M. Sageer, Rahman Bldg., 21-28, Churchgate Street, Fort, Bombay—Wants to be put in touch with the manufacturers of ornaments of Orient and French Gold.

211 Arjun Dev Dusaj, 10-C, Jeera, Secunderabad—Wants to be put in touch with the manufacturers of "Clensols" liquid soap.

360 Sadhu Ram Gupta Advocate, Rohtak, Punjab—Wants to be put in touch with the suppliers of neem seeds, neem oil and neem cake.

379 Rajendra Kumar Banarsi, Chhindwara—Wants to be put in touch with the manufacturers of dry ginger.

418 B. C. Naik, Bhadrak, B. N. Rly.,—Wants to be put in touch with manufacturers of mathematical instrument boxes at Bombay, Calcutta, Madras and Delhi.

519 R. K. Reddiar, Erakudi, Turaiyur, Tiruchirappalli—Wants to be introduced to philatelic clubs in India and world.

563 Sri Rama Sugar Industries Ltd., Seethanagaram, B. N. Rly.,—Wants to be put in touch with the suppliers of Plymoth Rocks, Brahma, Langshans, Wyndottes breeds of fowls.


LILY
GOLD PLATED.
JEWELLERY & BUTTONS
5 YEARS GURANTEED.
SOM PRODUCTS
1/1 A, SUBAL CHANDRA LANE, CALCUTTA.9


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Showrav hair Oil
Senora Toilet Soap
Sugandha scent
Ideal Snow.
P. K. SEN'S
DRUGS & CHEMICAL WORKS
CALCUTTA 9
SENORA

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THE MIRACLE MAN WITH UNRIVALLED POWER

India's Greatest Astrologer & Tantrik-Yogi



Raj-Jyotishi

JYOTISH-SHAMRAT PANDIT RAMESH CHANDRA BHATTACHARYYA, RAJ JYOTISHI, JYOTISH-SHIROMANI JYOTISHARNAV, M.R.A.S. (London) of International fame, President—World-Renowned All India Astrological & Astronomical Society. (Estd. 1907 A.D.) and Permanent President of Baranoshi Pandit Sabha (Benares) elected unanimously on 14 Feb., 1948.

He is the only Astrologer in India or even in the world who first predicted the Allies' Victory in the last world war on **3rd. Sept., 1939** within 4 hours the day of the declaration of war. This miraculous prophecy has earned for him praise and honour from His majesty King George VI, and Viceroy of India and the Governor of Bengal, similarly the wonderful prediction made by Panditji (Vide his Telegraph No. 19 of Hatkhola P. O. dated 3rd. Sept. 1946) about the future of Interim Govt. headed by our Great leader Pandit have already been proved correct.

In recognition of his profound scholarship, genious and Miraculous powers Panditji was honoured with tittle of "**Jyotish Shiromani** by All India Pandit Mahamandali in the gathering of hundred scholars all over India at Calcutta in December 1938 and again in February 1947 with greatest of all titles in Astrology "Jyotish Shamrat" in the presence of 250 scholars all over India at Benares in the Annual Conventions of Baranashi Pandit Maha Sabha. No Astrologer in India has received this signal honour in the annals of India till to day, who is also the consulting Astrologer of the **Eighteen Ruling** Chiefs of India.

It is well-known that the Astrological predictions of this great scholar, his wonderful methods of redressing the pernicious influence of evil stars, his power to bring success in complicated law-suits and also to cure incurable diseases are really uncommon. Many eminent personalities of the world **(England, America, Australia, Africa, China, Japan, etc.)** have given many unsolicited testimonials of the great Pandit's wonderful powders.

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JUNE, 1950

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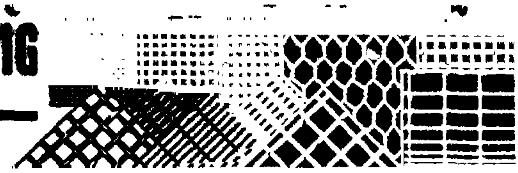
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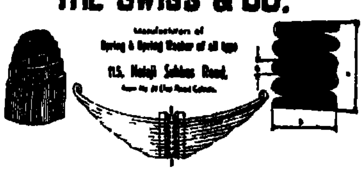
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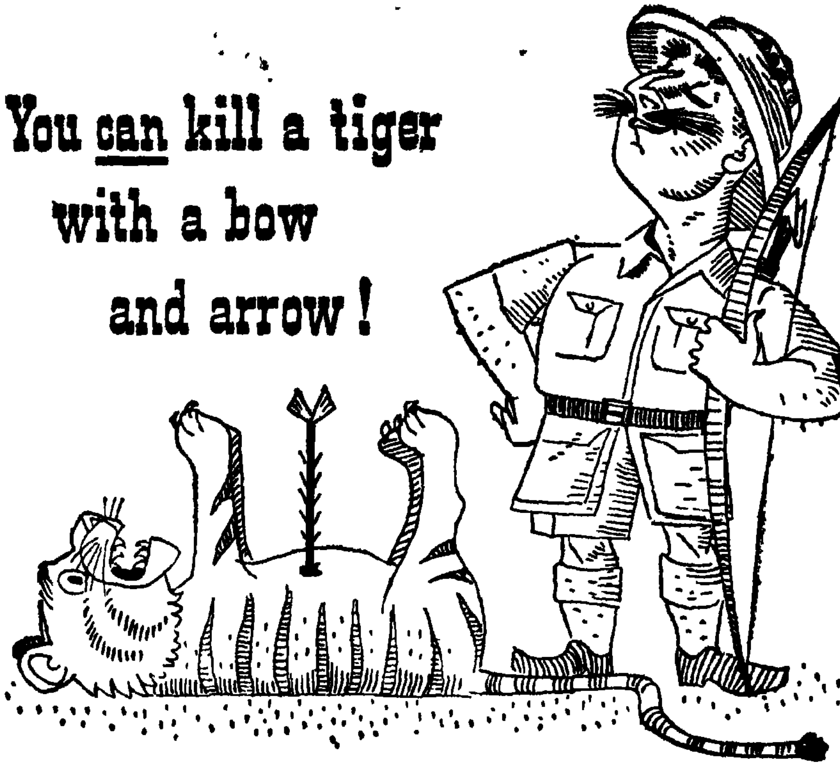
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VOL. XLI. CALCUTTA, JUNE, 1950. No. [illegible]

REHABILITATE SUGAR INDUSTRY

LAST December there was evident country-wide resentment against what was then dubbed as "Sugar Scandal" which from the consumer's point of view manifested itself in scarcity and soaring prices.

This sad phenomenon was rightly attributed to two factors, namely, Protection and the selfish money-grabbing activities of the Indian Sugar Syndicate, an organisation of monopolists whose main aim was to create artificial scarcity by taking advantage of decontrol and thus set the stage for abnormal rise in prices.

It seems quite heartening that the Sugar Syndicate has gone into voluntary liquidation and its work of distribution taken over by the Government. Wherever necessary the various State Governments have re-introduced sugar rationing and the decision taken, though at a belated stage, to withdraw Protection. The consensus of opinion in the country is that there was no justification for it at least since 1948 when the sugar production had returned to pre-war levels and foreign sugar was available for import at lower prices.

As for control, we have grave doubts if it could prove efficacious on the long-term view. It is acceptable only as a temporary make-shift and every effort should be made to open more sugar factories in India in order to be able to produce enough sugar which alone can liquidate black-marketing in the commodity.

Latest available figures indicate that India has produced less sugar this year than in 1949. Last year's production was a little more than 1 million tons with a carryover of about 2 lakh tons. This year upto April the production figure is only 964,000 tons and it is said that the total will not exceed 980,000 tons. It is a pity that there has been a fall in sugar production despite the many inducements offered to the industrialists at the beginning of the crushing season, which included exemption of excise duty for extra output and a reduction in cane cess. The economy is thus once more faced with bleak sugar prospects which can only be overcome by imports of foreign sugar.

WEST BENGAL'S COTTON MILLS

As a result of exodus of Cotton textile workers following communal disturbances the cotton mills in the industrial area round about Calcutta have been affected adversely. This was recently disclosed by Mr. A. K. Mitter, Chairman of the Bengal Millowners' Association who said that due to mass exodus of skilled workers in the weaving departments, production in the mills had gone out of gear.

Behind the perceptibly growing crisis in West Bengal's cotton textile industry there are other factors besides of migration of workers. One of these is the unsatisfactory position of cotton. Mr. Mitter referred to this difficulty in his address to the Association last month and regretted that the assurance given by the Government of India to make every endeavour to assist the mills to tide over their difficulty had not materialised. Regarding the suitability of imported cotton Mr. Mitter expressed his doubts if due to technical limitations involved our mills could use imported cotton in large quantities.

INDO-PAK JUTE AGREEMENT

As per the recent trade Agreement between Pakistan and India, Pakistan will sell to India 40,00,000 maunds of raw jute and buy 20,000 tons of jute manufactures. The Agreement also specifies the dates and quantities of goods to be delivered. Some feel disappointed that the Agreement makes no mention of either cotton or coal, the former being badly required in India and the latter in Pakistan. Obviously, the arrangement is no more than a piecemeal one and a wider settlement over other important articles to enable both to revive their trade is yet to come.

Jute Mills in India no doubt have been confronted with a crisis due to shortage of raw materials. On the other hand Pakistan's raw jute trade has been badly hit due to India's refusal to buy it at enhanced rates. The recent Jute Agreement between the two countries, therefore, has been received well in both States.

A fullfledged revival of trade between Pakistan and India is hardly possible before the exchange ratio between the two Rupees is fixed. Some think that Pakistan's Rupee is overvalued just as the Indian Rupee was before devaluation. This means that unless Pakistan devalues her currency India will have to pay more than she ought to for the goods she buys from Pakistan. Pakistan takes the line that her non-devaluation decision was based on purely economic grounds. Even so, she should not fail to see that this has put her at a disadvantage. Due to a virtual deadlock of her trade with India her balance of trade position has been affected adversely. If she finds it difficult to devalue her Rupee to the extent that the Indian Rupee has been devalued, even then she cannot and should not cling to overvaluation to the detriment of her own interests.

It is reported that the effect of the recent Jute Agreement on the raw jute market has been favourable. An easier feeling is said to have been created. Looking forward to supplies from Pakistan the balers in India are not buying raw jute at prices higher than the controlled rates. Growers who were sure till the other day that Indian mills had no other alternative than to buy jute from them now realize that they must dispose off their stocks at reasonable rates to avoid losses. In Pakistan, the report goes, distress selling has been checked and prices of raw jute are recording an upward trend.

The main points of the Indo-Pak Trade Agreement are as follows:—

1. The Trade Agreement is a short-term one. It covers a period from the date of signing to the end of July, 1950. The restriction on the period is reported to be due to the pending approval by the International Monetary Fund of the value of the Pakistan rupee, consequent on the devaluation of the pound.

2. Pending the approval of the I.M.F. of the value of the Pak rupee, the Agreement provides that the Indian rupee should form the basis of payment. This is undoubtedly a proof of recognition of the stability of the Indian rupee. This decision is evidently due to the need for avoiding currency difficulties. It is a temporary expedient and provides that trade transactions will be accounted for in the Indian rupee through a special account maintained for the purpose.

3. The Agreement is based on balanced exchange of commodities expressed in terms of money. It stipulates the sale of eight lakh bales of raw jute, valued at Rs. 15 crores by the Pakistan Jute Board, to the Indian Jute Mills Association, Calcutta. The purchases will be at the ruling Indian prices. The amount so acquired by Pakistan will be held in the account of the Reserve Bank of India. Again, purchases made by Pakistan in India will cover such items as cotton textiles, jute manufactures, steel, drugs, chemicals, mustard oil, and a few other minor items limited to the amount of Rs. 15 crores. Excepting jute, purchases of agreed commodities by Pakistan will be on private account. The purchaser in Pakistan will approach the State Bank for the requisite amount of Indian rupee holdings acquired by the sale of jute. It is stated that large quantities of Indian rupees are blocked in the State Bank of Pakistan while Pakistan rupees are held by the Reserve Bank of India. These sums are stated to be adequate to meet the short-term trade requirements of both the countries which are estimated to be about Rs. 30 crores.

4. The Indo-Pak Trade Agreement provides for sales of fish, vegetables and fruits to India free from import, export and exchange restrictions. Against these commodities, India has to supply such items as soap and matches. The intention is to maintain the balance of trade between the two countries.

5. A meeting between representatives of railway authorities of the two Governments is to be held within a fortnight (date of siguature of Agreement, 21 st. April, 1950) to facilitate the movements of goods by rail.

6. The Agreement provides for monthly meetings between the representatives of the two Governments to review progress in the implementation of the Agreement.

PAINT INDUSTRY

The Indian Paint industry is faced with a number of handicaps which are retarding its proper development. As disclosed by Mr. N. B. Beed, President of the Indian Paint Manufacturers' Association in a recent speech at the 8th annual meeting of the Association, the major difficulties are as follows:—

The grant of import licences does not conform to even the minimum requirements of the individual units. Not enough profits are being earned to enable the industry to meet replacement costs. Labour costs continue to be high while productivity is deteriorating. The prices of raw materials like zinc and lead are rising, while prices of finished products are not registering a corresponding increase. Certain new entrants in the field are not following sound business

principles and have sacrificed the quality of their products. And then there is the fear of competition from foreign products or foreign manufacturers starting factories in India.

Mr. Beed stressed the need for an early formation of a central organisation for the paint industry to remedy the defects mentioned above. He also made a plea for the licensing of paint factories. But so many new mushroom concerns have sprung up that the Government may turn down the plea as an impracticable one. The immediate need, as we see it, is to put the industry on a sound footing from the point of view of both production and marketing. Mr. Beed has referred to the defective purchasing policy of the Government. His allegation is that in purchasing paints the Government is returning the lowest tenders. Bombay's *Commerce* recently observed in this connexion: "Although such an attitude on the part of the officers concerned is not justifiable, a part of the blame for the same should be laid at the doors of those engaged in the industry itself, as these latter seem to be responsible for rate-cutting devices. Such undersirable practices may be ended by organising their sales under a central organisation."

FUEL RESEARCH

One of the most important recent events in our scientific cum industrial field is the opening of the National Fuel Research Institute at Digwadih. The opening ceremony was performed by the President, Dr. Rajendra Prasad. In his address on the occassion Dr. Prasad emphasised the need for conserving our limited stocks of high class coking coal which at their present rate of consumption, he declared, would not last for more than 30 years.

Coal is one of our most valuable resources and its importance to our industrial economy becomes all the more [illegible] on account of the fact that India possesses high grade iron ore reserves. Metallurgical industries need good quality coal and unless we increase the latter's output and conserve whatever stocks of it at present are available, we can never hope to develop our metallurgical industries to any appreciable extent. The newly opened Fuel Research Institute at Digwadih, therefore, should be viewed as a significant development for the purpose of solving the fuel problem with which is linked up the question of this country's industrial development.

Almost every Committee set up from time to time to make enquiries into the coal position and suggest methods of improving its output—has urged the establishment of a Fuel Research Institute. The importance of coal to our economic life can be well gauged from the fact that it is used for producing thermal electricity, for running trains, for propelling ships, for smelting purposes, for conversion into gaseous fuel, etc. Dr. Prasad pointed out that coal of high volatile content other than the metallurgical type had their special uses, such as carbonisation, by-products recovery, synthetic production of oils, etc. Coal-tar has been developed as an independent industry and from it have been manufactured antiseptics, germicides, insecticides, etc.

Even though the object of the Fuel Research Institute is to cover all aspects of research fundamental as well as applied on solid, liquid and gaseous fuel, for the present its main subject of study will be coal. It is said that the Institute will be assisted by five other satellite research organisations in Bengal, Bihar, Vindhya Pradesh, Madhya Pradesh and Assam.

Speaking on the occasion of opening of the institute at Digwadih Dr. J. C. Ghosh, Director-General, Industry and Supply said that cowdung was being [illegible]

[illegible] and that its use [illegible] to be replaced by that of domestic soft coke. At present India imports 2.8 million tons of petroleum. Dr. Ghosh said that at least half this quantity could be obtained by converting indigenous coal into oil.

VILLAGE OIL INDUSTRY

The Village Oil Industry and Crushing Sub-Committee of the Indian Oilseeds Committee met in New Delhi some time ago and decided that a cess should be levied on all oils crushed in power mills. The idea is to help create a fund for the development of the Indian rural oil industry.

Some think that there is no point in these days of mechanisation to try to put the hands of the clock back by seeking to develop the outmoded *ghani* production of oil at the cost of oil mills operated by power. It is argued that the *ghani* is uneconomic and the yield of oil crushed with its help is meagre compared with that put out by the modern mills driven by electricity or diesel oil. The need to-day is to urbanise village economy itself and not make a desperate attempt to give a fresh lease of life to some of its obsolete features by penalising efficiency such as the modern powder-driven mills alone are capable of.

By imposing a cess on the oil mills the Indian Oilseeds Committee hopes to raise the price of mill oil to the level of the price of the ghani oil. According to *Commerce* —and we are in agreement with its view —it ought to have been possible to achieve this aim by modernising the *ghani* itself. *The Commerce* goes on to say, "Today engineering technique has been successful in designing a small metal oil crushing rotary, driven by electric power, which is more efficient and economic than the outmoded *ghani*. The use of this metal rotary will enable the village oil producer to reduce his cost, to increase his output, and thus [illegible] to [illegible] his own position in the rural economy and that without having to impose a burden on the large-scale producer of oil."

PROBLEMS OF AGRICULTURE

Some time ago Prof. Ashby, Director, Institute for Research in Agricultural Economics, University of Oxford was invited by the Indian Society of Agricultural Economics to study the position regarding teaching and research in agricultural economics. Prof. Ashby after completion of his study tour has issued a report which contains his reflections on some of the aspects of India's rural economy.

Prof. Ashby regrets to note that so far very meagre provision has been made for research and investigation even though Indian economy is mostly agricultural and our vast mass of rural population engaged almost exclusively in agricultural occupation. Prof. Ashby does not think that there is any real dearth of qualified men in this country to undertake the work of agricultural research. Lack of proper facilities has only forced them to choose some other occupation.

Agricultural co-operation, according to Prof. Ashby, has not been given a suitable trial in India. He suggests that the movement should be keyed up by all means to promote the growth of responsibility, competence and independence among our cultivators. The Co-operative movement in India is more or less an officially sponsored movement.

Prof. Ashby lays stress on the need to educate the village folk in the following words:" All kinds of necessary and effective technical and social changes are largely dependent on the acquirement of the capacity to read, write and figure accurately by all the population."

Among other important points made

by the Professor are the problems of health and sanitation, transport facilities, fuel, etc. Prof Ashby regrets that efforts at reconstruction have remained rather localised and not widened to any perceptible extent. In view of the fact that our economy is more or less rural in character the newly set up Planning Commission ought to devote its immediate attention to the many problems of our agriculture with a view to raising the standard of living of our rural common-folk who have remained in the grip of poverty for ages.

POWER FOR RURAL AREAS

Speaking at the 20th Annual Conference of the Mechanical Engineers' Association at Poona on the 20th April Mr. N. V. Gadgil, Minister for Mines, Works and Power held out the hope that the execution of Bhakra, Damodar Valley and Mahanadi Projects would release an additional 1,000,000 kw of power, apart from bringing 4,000,000 acres of land under cultivation. About 2,000,000 kw of power are being generated now from hydraulic and thermal resources. But most of it is being used up in the industrial areas. Mr. Gadgil, therefore, wanted that adequate facilities should be given to the rural areas to use more power.

TEA'S NUTRITIONAL VALUE

Tea is usually looked upon as a stimulating beverage which contains no nutritional value. But this theory is now being disputed by scientists who hold that caffeine in tea stimulates the central nervous system providing incentive to work. It is said that tea affects the circulation, respiration and the kidney. The negative value of tea is that its use is leading to a reduction in the consumption of alcoholic beverage. On the positive side the milk and sugar taken with tea bring in a contribution of calories. Tea also contains easily assimilable calcium.

Anodic Oxidation of Aluminium

THERE is a growing number of protective coatings finding commercial use which are neither of the metallic nor the paint type. Some of these, for example, ceramic and chemical dip coatings, have been employed for years, while others, notably oxide coatings of aluminium, are of more recent development. In any case, considerable progress has been made in the quality of protection to be obtained from these coatings, and some of the processes have assumed outstanding importance.

The anodic oxidation of aluminium and its alloys produces a surface coating which is totally unlike the metal in character, and possesses a rather remarkable group of properties. When properly prepared, the "anodized" coating displays relatively high resistance to corrosion and abrasion and provides high electrical insulation to the underlying metal. It may be coloured with a variety of organic dyes and pigments to produce attractive decorative effects. Because of these qualities, oxidized aluminium coatings are coming into common use for the protection and decoration of a wide variety of aluminium products.

The tendency of aluminium to form a superficial film when made the anodes of an electrolytic cell has been known for many years. The unidirectional current characteristics, of this film, or electrolytic valve action as it was called by Wheatstone in 1855, become the subject of considerable investigation, the outgrowth of which has been the aluminium electrolytic condenser and rectifier. Among the early suggested applications of the oxide coating, other than for such electrolytic devices, was its use in the electrical insulation of aluminium wire, and its application to cooking utensils to prevent adherence of food. It was not until 1924 that the first process of producing relatively thick anodic coatings on aluminium for corrosion protection was patented. This process, known as the Bengough and Stuart chromic acid process, was developed for the protection of Duralumin seaplane parts from corrosion by sea-water. It is still extensively used as a finish and as a surface pretreatment before painting, for aircraft parts fabricated from aluminium and its alloys. The chromic acid process has been largely superseded in the United States and Europe for most other uses by a process employing sulphuric acid solutions as electrolyte, and in Germany and Japan, oxalic acid is said to be used.

CLEANING THE SURFACE

Common to all methods of anodising is the necessity of securing an initially clean metal surface. This is usually accomplished by a brief immersion in a warm alkali cleaner suitably inhibited if necessary to prevent attack on the metal. The parts are sometimes in strong alkali to produce an etched or diffusing surface: this treatment is followed by a dip in nitric acid. Traces of the cleaning solutions are removed by thorough rinsing in water before subjection to the anodic treatment.

CHROMIC ACID PROCESS

In the chromic acid process a 3 per cent. solution of chromic acid is used and maintained at 40-45°C., cooling coils being required because of the liberation of heat in the operation. Upon immersion of the work in the solution, the voltage is raised to 40 volts during 15 minutes, maintained there for some time, and then raised to 50 volts in total time taken being about 1 hour. The current

[illegible] employed ranges from 0.27 to [illegible] ampere per sq. dm. (2.5 to 4 amperes per sq. ft.). The coating is finally rinsed and dried.

The "Eloxal" process of oxidation originally consisted in anodically treating aluminium in dilute oxalic acid to which had been added a small percentage of chromic acid. The bath was operated at 15° to 30°C with an applied voltage of 60 to 100 volts and a current density range of 60 to 300 amperes per sq. dm. Now, however, the procedures of "Alumilite" process are available in Europe and are used in Germany under the trade-name "Eloxal."

SULPHURIC ACID PROCESS

The most important anodizing process is the "Alumilite" process employing sulphuric acid as electrolyte. Among its advantages are lower cost, rapidity, low voltage operation and the production of colourless and transparent films of a greater range of physical properties on aluminium and a wide variety of aluminium alloys. One commercial limitation of chromic acid process is the necessity of "batch" operation to secure the full voltage treatment. It is restricted also to alloys of aluminium containing not more than approximately 4 to 5 per cent. of heavy metals. The sulphuric acid process is not subject to these limitations; almost all of the important aluminium alloys, whether wrought or cast, may be treated, and if desired the oxide films produced on these materials may be coloured.

Films having a rather wide range of thickness and hardness may be produced in sulphuric acid solutions by suitable adjustment of acid concentration, temperature and time. The acid strength has been varied from 5 to 77 per cent. by weight, and the temperature from about 16° to 40°C (60° to 105°F). A standard uncoloured coating is produced in 15 to 15 per cent. sulphuric acid [illegible] 30 minutes at 22°C (71°F). The temperature must be held constant within 2 or 3 degrees if the best coating is to be produced. The process is operated at about 1.4 amperes per sq. dm. (13 amperes per sq. ft.), and this requires from 10 to 20 volts D.C. (Direct Current).

Considerable variation in the process may be made to suit manufacturing conditions provided this variation is held within certain limits. The current tends to form oxide at the surface of the metal, whereas the acid electrolyte tends to dissolve the oxide so formed. Increasing the acid concentration or the temperature increases the attack on the oxide. While the effect of current density is less pronounced, the use of higher current densities tends to counterbalance the rate of oxide dissolution. Films produced under conditions of higher solubility are softer, more porous, and somewhat more flexible than those obtained at lower temperatures and acid concentrations. By appropriate combinations of temperature and concentration it is possible to produce similar films under different operating conditions. For instance, coatings of similar abrasion resistance may be obtained from 5 per cent. acid baths operated at 32°C (90°F), and 18 per cent acid at 24°C (75°F). However the coatings formed in the two cases are not identical, the first being somewhat more dense than that formed in the second case.

SEALING THE OXIDE COATING

Following the anodizing operation the oxide coating is usually "sealed" by immersion in boiling water, or in live steam for a period of time equal to that of the electrolytic treatment. By this step (which must be carefully controlled to obtain a uniform product), the oxide comprising the coating is partially converted

[illegible]

[illegible] volume. The result is a reduction in film-porosity and also in hardness, improving the corrosion resistance and stain resistance, but reducing hardness and resistance to abrasion. This treatment largely prevents the tendency of the oxide to "chalk" upon prolonged exposure to the air.

Where corrosion resistance is the primary consideration, it has been found advantageous to substitute for the hot-water sealing operation a treament in hot dilute dichromate or sodium silicate solutions at 80°C., or in dilute chromic acid solution. The dichromate seal is particularly effective in improving the corrosion resistance of thin films. Lanolin, paraffin or linseed oil are sometimes used as impregnants to improve the corrosion resistant quality of the coating.

COLOURING

In the production of oxide coatings which are to be coloured, it is desirable to employ films which are relatively soft and porous, and these are usually prepared by the use of the higher acid concentrations and temperatures, as previously described. The colours used may be dyes or mineral pigments. Usually, acid colours of the alizarin type are employed; these are applied by immersing the anodized part for a few minutes in a warm solution of the dye. The dyed coating is then sealed in hot water or in a hot dilute solution of nickel acetate, the latter improving the fastness of the dye. Mineral pigments are applied by precipitation within the pores of the coating. For example, a yellow may be produced by first treating the anodized coating with a solution of potassium dichromate rinsing and then treating with a solution of lead acetate.

The thickness of electrolytic oxide coatings in commercial use ranges from [illegible] 0.0001 to 0.001 inch. For [illegible] ness of the order of [illegible] inch generally gives good results. As previously mentioned sealing with hot water or in alkali dichromate are measures designed to improve its protective value. If not physically injured, properly prepared oxide coatings should protect aluminium and its alloys several years against corrosion by ordinary outdoor atmospheres. Indoors, the life of such coatings appears to be almost indefinitely long. In severe marine exposures it is customary to secure additional corrosive resistance by application to the anodized surface of paints of the aluminium pigmented synthetic resin type.

The hardness of the electrolytic oxide film on aluminium varies somewhat with the distance from its outer surface, the hardest region being next to the metal-oxide interface.

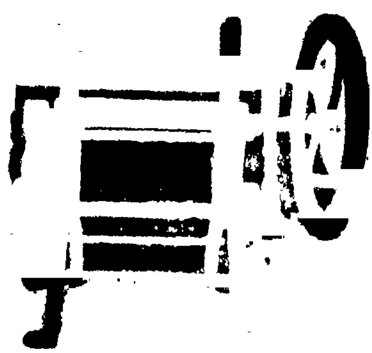
The abrasion resistance of oxide coatings has been measured on the same series of coatings by two laboratories with fairly close agreement. It is found that abrasion resistance increases with coating thickness.

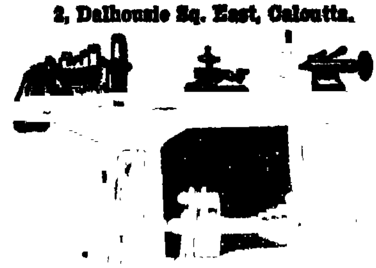
As mentioned earlier, the anodized finish displays high electrical insulation. The values of dielectric strength upto 4000 volts are obtainable with the hardest films. In films of commercial importance it is usual to secure values of breakdown voltage in excess of 200 volts. Probably the most convenient test of coating quality is its breakdown voltage.

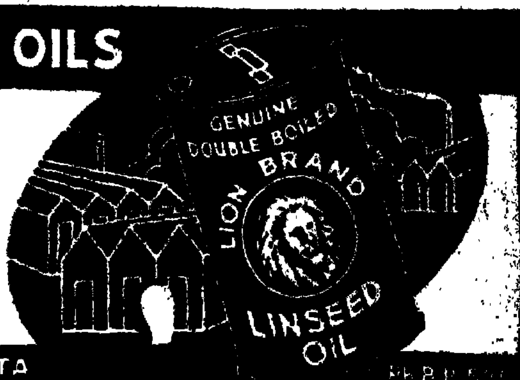
USES

The application of anodized coatings have become extensive. Their oldest and perhaps most general application is in aircraft. The combination of electrical insulation and corrosion resistance has made it particularly useful in electrical apparatus. They are commonly employed

increase the corrosion resistance of aluminium and aluminium alloy articles, such as refrigerator, ice-trays and apparatus parts. Because of the hardness of these coatings, the finish is used on machine parts and pistons to protect against abrasion, seizer and to reduce friction. coloured finish is used on small articles, furniture and fixtures of various kinds. In the architectural field, oxide coatings are employed extensively for window frames, stores fronts and interior fittings.







Processing of Chemicals into Tablets

ANY material is capable of being compressed provided it is in a suitable form for the tablet machine. It would be an impossibility to give complete list of substances and their individual treatment. As tablet compression is applied mainly to chemicals and such like substances, it might be of assistance to the beginner to have a list of chemicals generally found in use in tablet form, with a short note on the treatment of such chemicals. It would form a basis to work on when similar materials have to be compressed.

ASPIRIN

Obtain in coarse crystal form.

Add starch (10%).

No further treatment required. Simply compress into tablets.

ACID SALICYLIC

Obtain in fine powder form.

Binder—Gum Acacia 2½%.

Starch—10% (part as paste for granulating).

Lubricant—Liquid paraffin 0.5% and talc 3%.

BISMUTH CARBONATE

Obtain in fine powder form.

Moisten with Gum Solution.

Starch 3%.

Lubricant—Liq. Paraffin B.P. 0.5% and Talc. 3%.

Bismuth Carb. is generally used for digestive tablets and in combination with Sodium Bicarbonate and Magnesia.

CAFFEINE

Obtain in fine powder form.

Base—Lactose.

Moistening agent—Gum Solution.

Lubricant—Talc. 3%.

CALCIUM LACTATE

Obtain in fine powder form.

Lactose is usually added—proportions 1 part Lactose to 5 parts Calc. Lactate.

Moistening agent—Spirit and Water 50-50.

Lubricant—Liq. Paraffin B.P. and Talc 0.5% and 3% respectively.

CHARCOAL

Obtainable as Vegetable Charcoal or Animal Charcoal. The latter is the better of the two for compressing, but the former is generally in use. Unfortunately, it is the more difficult. The material requires a large quantity of binder.

Use Gum Tragacanth 4% and add Gum Solution until the material is well moistened to produce a good granule.

Lubricate with Liq. Paraffin B. P. (approximately) 1 dram per 1 lb. of granules.

Water sprayed on the dried granules will facilitate binding. A reasonably firm tablet can be made by this means. Leave the tablets to dry after compression.

DEXTROSE MONOHYDRATE

The best result is obtained by granulating fine powder.

Moistening agent—Water.

Lubricant—Talc. 3%.

EPHEDRINE HYDROCHLORIDE

Triturate with equal parts Lactose.

Moistening agent—Gum Solution.

Lubricant—Talc. 3%.

FERRUM CARB. SACCH. (SACCHARATED IRON)

Use ferrum Carb. Sacch.

Binder—Gum Acacia (approximately 2%).

Lubricant—Talc. 3%.

Disintegrator—Starch 5%.

Moistening agent—Weak Gum Solution (1 in 10 strength).

HEXAMINE

Obtain in crystal form.

Compress warm.

No other treatment.

RED MERCURIC IODIDE

Base—Lactose.

Triturate thoroughly.

Moistening agent—Gum Solution.

Lubricant—Talc. 3%.

PARAFORMALDEHYDE

Obtain in fine powder form.

Base—Icing Sugar.

Binder—Gum Acacia (approximately 5%).

Moistening agent—Gum Solution.

Lubricant—Talc. 3%.

Granulate the Icing Sugar and add the Paraformaldehyde to the dry granules before compressing.

PHENACETIN

Obtain in fine powder form.

Binder—Gum Acacia 3%.

Disintegrator—Starch 3% (use in dried granules).

Moistening agent—Gum Solution.

Lubricant—Liq. Paraffin B.P. and Talc. 0.5% and 3% respectively.

PHENOLPHTHALEIN

Base—either Chocolate Powder or Icing Sugar.

Mistening agent for Sugar Base—Gum Solution.

Moistening agent for Chocolate Powder—Water.

Chocolate Powder base will require a little dark brown colour.

Flavour—Vanilla for both.

Lubricant—Talc. 3% for Sugar base.

No lubricant required for Chocolate Powder base.

Medicinal strength of tablet according to requirements.

Usual strengths: Phenolphthalein 1 gr. in 1½ gr. tablet: 2 gr. in 4 gr. tablet.

[illegible]

Obtain in crystal form.

Requires no lubricant.

For incorporation with other ingredients use fine powder.

RESIN OF PODOPHYLLUM

Base—Lactose.

Moistening agent—Gum Solution.

Lubricant—Liq. Paraffin B.P. and Talc. 0.5% and 3% respectively.

QUININE SULPHATE

Base—Lactose.

Binder—Gum Acacia.

Disintegrator—Starch.

Lubricant—Talc. 3%.

Use part of starch for granulating paste, and the balance to dried granules.

REDUCED IRON (FERRUM REDACT)

Base—Lactose.

Disintegrator—Starch ¼ oz. to 1 lb. base.

Moistening agent—Water.

Lubricant—Liq. Paraffin B.P. and Talc. 0.5% and 3% respectively.

SACCHARIN

Binder—Gum Acacia 1%.

Moistening agent—Gum Solution.

Usually in combination with Sodium Bicarbonate.

Lubricant—Liq. Paraffin B.P. and Talc. 0.5% and 3% respectively.

SANTONIN

Obtain in crystal form.

No treatment.

SODIUM BICARBONATE

Binder—Gum Acacia 3%.

Moistening agent—Gum Solution.

Lubricant—Liq. Paraffin B.P. and Talc. 0.5% and 3% respectively.

SODIUM CITRATE

Binder—Gum Acacia 3%.

Moistening agent—Water and Spirit (50-50) quantity sufficient.

Lubricant—Talc. 3% and Liq. Paraffin B.P. 0.5%.

Binder—Gum Acacia 2%.

Disintegrator—Starch 10%.

Lubricant—Talc. 3% and Liq. Paraffin B.P. 0.5%.

Use part of the Starch as paste for moistening.

SULPHUR (SUBLIMED SULPHUR)

Base—usually Icing Sugar combined with Cream of Tartar.

Binder—Gum Acacia 3%.

Moistening agent—Gum Solution.

Lubricant—Liq. Paraffin B.P. and Talc. 0.5% and 3% respectively.

Flavour as required.

HYDRARGYRUM CUM CRETA (MERCURY WITH CHALK)

Base—Lactose.

Disintegrator—Starch.

Moistening agent—Gum Solution.

Base, Disintegrator and Binder form 50% of the tablet.

Lubricant—Talc. 3%.

MORPHINE SULPHATE

Base—Lactose.

Binder—Gum Acacia.

Moistening agent—Gum Solution.

Lubricant—Liq. Paraffin B.P. 0.5%. Talc. 3%.

• Base, Binder and Lubricant form 50% of the tablet.

SALOL

Binder—Gum Acacia 5%.

Disintegrator—Starch 5%.

Lubricant—Talc. 3% and Liq. Paraffin B.P. 0.5%.

STRYCHNINE

Triturate with Lactose as base.

Moistening agent—Gum Solution.

Lubricant—Liq. Paraffin B.P. and Talc. 0.5% and 3% respectively.

SULPHONAL

Binder—Gum Acacia 3%.

Disintegrator—Starch 3%.

Moistening agent—Water.

Lubricant—Talc. 3%.

Add Starch to dried granules.

TINCTURES

Lactose is used as a base.

If the quantity of tincture is too small to incorporate with the amount of Lactose, use concentrated tincture sufficient to give an equivalent amount of drug.

Moistening agent—Gum Solution.

Lubricant—Liq. Paraffin B.P. and talc. 0.5% and 3% respectively.

YEAST

Obtain finely powdered Yeast.

Binder—Gum Tragacanth 2%.

Moistening agent—Spirit.

Lubricant—Talc. 3%.

} Alternatively, a specially prepared granule can be obtained which will obviate the granulating process.

—Bleaching and Dyeing of Bristles

THE most valuable horsehair for commercial purposes is that from the mane and tail. Tail hair fetches the highest prices when it is over 57½ centimeters long. And sometimes it is from 75 to 85 centimeters in length. Mane hair, on the other hand, is seldom longer than 45 cm. True white hair is in best demand, and next comes the jet black hair. The market value of some, brown, or gray horsehair is not anywhere as high as that of white. Skin hair is also used for various purposes, such as upholstery and cushions, and is also spun into coarse yarn to be used for weaving hair cloths used for living men's overcoats to keep their shape. Skin horsehair, together with cow hair, frequently mixed in the mortar used for ceilings to make it hold better. The shorter mane hair is very much in demand for high grade upholstering.

Now the chief consumers of all horse hair fabrics are the manufacturers of sieves and filters to be used and in making flour, gun powder, oils, and so forth. Also this hair used for filters and filter goods once it is cleaned is seldom dyed. Horsehair of the better quality often is taken instead of cow or donkey hair, for making high class driving belts. Hair goods are often used for military cracats. The principal uses for high grade white horse hair, however, is for violin and cello bows. Only the best material when used in this way can withstand the friction from the constant action of the bow across the strings of the musical instruments.

A short description of the use of horse hair for violin bows may be interesting. The animals are especially chosen as suitable for the supply of raw material. The mane hair is cut off from the horse close to the root, the shortest length of the hair sorted out being about 75 cm. When it has been cut out the hair is tied in convenient bunches and sent to the finisher. The work of the finisher is usually not on a very large scale and therefore his outfit is simple consisting of little more than a few large vats to contain the cleaning fluid, an iron boiler of about 450 litres content, heated with wood or coal, for warming up the water and a few other simple articles of equipment.

PREPARATION OF HAIR FOR CLEANING

In the preparation of the hair for cleaning, the ends are cut evenly and each end is dipped into a flat tub, containing a melted mass that consists of paraffin, shellac, and rosin in their equal porportion. When cooled the mixture becomes firm like ordinary sealing wax and the hair ends are fastened in a bunch. Sometimes instead of the shellac preparation melted pitch is used, some finishers even preferring pitch since it neither saponifies nor becomes sticky in a strong cleaning bath as the other agents do.

CLEANING

For cleaning bow hair, soap and ammonia, or—if the hair is very dirty—soaps and pearl ash are used. In the cleaning the hair bunches are stretched crosswise over a portable wooden frame and the ends attached lightly to the side of it. The whole is then dipped a few minutes into the cleaning bath, whereupon the frame is taken out and laid on a wooden bunch on which a row of parallel grooves of about 2½ cms' width are carved out for the reception of each strand of hair. The water then takes a flat trust of white pigs' bristles and brushes carefully with soap lye each of the strands lying in its groove. After this process the frame with the strands again is entered into the wash tub and [illegible]

[illegible] It then is placed in another ... tub several times in clear warm water in order to remove any remaining soap. The frame is laid aside for the strands of hair to dry somewhat.

BLEACHING

The goods are now ready for bleaching with sulphur fumes. The equipment used for this purpose consists of a gastight wooden box that holds about six of the above mentioned strand filled frames. A number of wooden holders are adjusted at the sides of the bleaching box, forming spaces between the frames. In the double bottom of the bleaching box there are a number of holes to permit the passage of the sulphur frames produced by burning lump sulphur in an iron pan in the space formed by the double bottom. The goods are allowed to remain in the bleaching box overnight, and on the following day the frames with their contents are removed from the apparatus and rinsed repeatedly with water, in which process a little washing blue is added to the last bath to remove any yellow tinge from the hair. The frames then are placed on a wooden stand for dripping. This usually takes place in some well-aired room apart from the cleaning plant both to dry the hair and at the same time to remove any odour of the sulphur fumes. Finally the strands are cut from the frame and sorted.

TREATMENT OF HAIR FOR WEAVING

Horse hair from the mane and tail, when it is to be used for weaving hair cloth is always cleaned until it is perfectly free from all impurities. Before beginning the cleaning process, the hair is sorted out into bunches of suitable lengths, the fastening of which is left loose enough for the cleaning fluid to pass through it easily. The equipment used for cleaning the hair consists of a wooden tub of about [illegible] square metre surface, fitted with a double bottom with perforations, to provide for circulation of the fluid. A steam pipe to heat the bath is fitted into the space formed by the double bottom. The liquid is circulated by means of a centrifugal pump. The bunches of hair are put into the dry tub, and care should be taken that a firm package is formed that does not have openings for the liquid to rush through. When the packing is completed, a wooden lattice is laid over the bunches of hair. This device consists of a number of hardwood stoves, fixed crosswise as in a garden lattice. The railing is attached by metal clamps to prevent its rising up when the tub is filled with the cleaning fluid.

The cleaning is carried out at a temperature of about 36°C using soap and soda or soap and ammonia. Generally after a fifteen minutes' treatment of a lot, the liquid is let off into a reserve container, and the bunches taken out of the apparatus and then laid in again but in a different position, the purpose of the change being to effect a thorough cleansing. After a treatment of an hour all in all in the cleaning bath, the exhausted liquid is let off and the tub again filled with fresh warm water to rinse off the residual soap. After several such rinsings the bunches are removed from the apparatus and centrifuged.

DYEING

If the cleaned goods are to be dyed, about the same kind of apparatus is used as is usually used for cleaning purposes. But almost any kind of package dyeing machine can be used for dyeing the bunches, it being unnecessary that the circulation of the water be effected by centrifugal pumps, since direct steam also can be applied for this purpose. Black and brown after-chroming dyestuffs usually are used for the purpose of fast dyeing of

[illegible] fastness to light and washing being [illegible]. Acid blue-black is used only [illegible] special fastness to light and rubbing [illegible], but when fastness to washing [illegible] important.

In order to insure a thorough penetration of the colour, the process is carried out at a boiling point for from one and a half to two hours. Experience shows that dyed horse hair turns out very much lighter if it is taken out of the bath sooner. By using a more strongly acidified bath, it is possible to apply any well known acid dyestuff, that goes on the fibre evenly, for the dyeing of horse hair. In cases where it is necessary to bleach out the natural colour of the hair strands to some extent, a short treatment in a boiling, weakly acidified bath with an approximate 3 per cent content of sodium sulphate formaldehyde will serve the purpose.

PIGS' BRISTLES

High grade white bristles as used by the makers of tooth brushes and other [illegible] brushes. The natural coloured goods are usually converted into cheap curled hair for filling mattresses and other similar goods. The bristles are clipped off from the slaughtered pig when it is taken out of the scalding vat. The best material is from along the spine towards the end, and from the [illegible]. The various kinds are sorted out [illegible] the other and arranged according to length and colour black, white and [illegible] being the ordinary shades.

[illegible]

After the bristles are scraped off [illegible] pigs they are dried in flat boxes [illegible] [illegible] being [illegible] light fabric when [illegible]. When [illegible]

[illegible] skin and flesh still clinging [illegible]. The material is then packed [illegible] bags for further treatment by the brush manufacturers.

SORTING

The goods are mostly sorted out by hand and the bits of skin or dirt on the goods removed by rubbing them across the ridges of the metal bottom of a flat trough. Thereupon the bristles are transported to another part of the equipment which is fitted with a bottom similar to a fine mesh sieve. The entire lot of bristles is then worked for a while on this sieve, when most of the dust falls through the mesh, which the worker removes by hand any particles of dirt which are too large to fall through. After the bristles have been treated in the above manner they are packed for wet cleaning in sacks of 5 lbs. lots.

CLEANING

In small plants the cleaning apparatus consists of a number of large barrels, the upper part of which have been removed. The goods are treated in these. The sacks in the cleaning fluid are kneaded and pressed by a workman, a pounder being used. In better equipped plants there is a machine which is similar to the fulling apparatus for the manufacture of felt hats. This machine is fitted with a number of wooden pistons, to which are attached rubber suction cups, and the movement to and fro of these pistons, operated by the propelling force of the driving mechanism connected with them, removes all impurities from the bristles by suction and pressure.

When the bristles have been cleaned, the bags are pressed in the [illegible] which consists of two boards of heavy wood lying parallel, [illegible] is fastened to a [illegible]

upper board is movable and fitted with a long handle to obtain the necessary leverage for the desired pressure. Since the whole is portable it can be used at the side of any tub in the plant wherever it is needed. The soap water which is squeezed out of the sacks is collected in a trough fastened underneath the apparatus. After the soap water is pressed out, the sacks containing the bristles are rinsed in warm water until they are quite free from soap and then pressed out again, when they are ready for bleaching.

BLEACHING

Before peroxide bleaching came to be generally adopted, pigs' bristles were cleaned with sodium bisulphite, but the latter is now being used less and less since results are much better with the newer process. However, where a cheap process is necessary, bisulphite is still applied. The bath for bisulphite bleaching contains 1 litre of sodium bisulphite of 75°Tw. to 100 litres of water. The bags containing the bristles are soaked for 1 hour in the cold liquid, being turned from time to time, and then entered in a tub of fresh cold water for careful rinsing.

For peroxide bleaching, wooden tubs are used, fitted with lead steam pipes for heating the liquid for a bath of 135 litres. 9 liters of bleaching agent are used, consisting of hydrogen peroxide (12% by volume), in conjunction with a sufficient quantity of ammonia to make the bath slightly alkaline. The sacks containing the bristles are entered into the cold bath, and when they have been moved about by hand for a time, the temperature of the bath is slowly increased to 50°C. The bath is then permitted to cool from 6 to 8 hours, when the bags are removed from the liquid squeezed off and rinsed. The goods are then taken out of the sacks and laid in flat cloth covered containers for drying.

DYEING

The pigs' bristles are dyed in suitable sacks in a package dyeing machine, where the circulation of the liquid is effected either by a pump or by direct steam pressure. In smaller works the sacks are treated in open tubs, in which case they are hung on wooden poles placed across the top of the tub—each sack containing about 2 lbs. of bristles. After chroming black and logwood black are the main dyes for bristles which are intended for brush making. During this process care should be taken that the bristles are thoroughly soaked through, as the ends of insufficiently soaked bristles, when made into brushes and trimmed, will have a gray or purple appearance.

Generally the black goods are given a light soap bath after the dyeing, in order to free the bristles from any loose dyestuff particles. For this treatment olive oil soap is used, a small quantity of pure olive oil being generally added to the bath also to give the goods a better lustre.

—Chemistry of Barrier Creams

BARRIER creams were popularised in the early days of the late war when cosmetic manufacturers and others found their sales output restricted and, therefore, marketed bulk quantities of their products to industry as protective creams.

The influx into industry of unselected personnel resulted in an increase of skin troubles due to various causes, always classified as Dermatitis, but not always caused by sensitivity to the hazards encountered. It is often the soaps, powders, detergents and cleansing materials, including sacking, a cause of chafing, which are the causative agents. People with thin, sensitive, dry or ichthyotic skins are pre-disposed, and in some cases focal infection is a pre-disposing factor—as is a tendency to Seborrhoea.

Seasonal dermatoses can easily be confused with industrial, and it is well to bear in mind that cold stimulates and aggravates not only chilblains, but also eczema, psoriasis, seborrhoeaic dermatitis, and ichthyosis: scabies and contact dermatitis, due to soap, wool, and fur, are common in winter. More frequent in summer are the urticarias, hyperhidrosis, miliaria, and the numerous plant and and vegetable dermatoses.

ERUPTIONS AND THEIR CAUSE

(i) Acute Darmatitis, is usually due to general or specific irritants

(ii) Chronic Dermatitis (squamous or fissured), to fat solvents or detergents.

(ii) Folliculities, to oils, tar, greases and chlorine.

(iv) Keratosis, to oils, coal tar products, arsenic, anilines, etc.

A barrier cream therefore, should give protection against a wide range of substance, both water-soluble and oil-soluble.

Present day barrier creams can be divided into five groups:—

(a) Vanishing Creams;
(b) Soaps;
(c) Creams (Oil in water, or, water in Oil);
(d) Solution of gum in spirit (mastic, benzoin, etc.).

All should satisfy the following conditions:—

(i) It must be bland and emollient, suitable for continued application to muscous surfaces, on which it must dry quickly and hold for at least 2 hours and give 4 hours protection on the skin;

(ii) It must be free from greasiness and should have a surface pressure of not more than 12 dynes per sq. cm., so that grip will be retained and tools comfortably handled without slipping out of the hand or curling the barrier off the skin by friction of movement;

(iii) It must be insoluble in and impermeable to the substances against which it is claimed to give protection;

(iv) It must be readily removed with soap and water;

(v) It must not sweat off to deposit stains upon surfaces, particularly if they are to be plated, polished on further processed;

(vi) The pH should be as near neutral as possible.

Many formula have been devised, all with respective merits, but none satisfying all the necessary requirements. The Factory Department of the Ministry of Health and Labour devised and recommended a water-proof barrier of the following composition:—

Soft paraffin	3
Lanoline	1

a formula which it is impossible to use

under ordinary working conditions without greasing everything which is handled. Lanoline is not a suitable medium for barrier creams because it absorbs most phenolic substances and carries them into the skin and thus accelerates the onset of dermatitis.

Soaps afford certain protection—particularly when mixed with 20—30 per cent. of Kaolin—against a number of hazards, but it must be admitted that their principal virtue is that of effectively and conveniently cleansing the worker's hands and arms at the end of each shift.

The vanishing cream types which were originally recommended in the U.S.A.—two formulae given below—are supposedly protective against oils and suds and will be referred to later. They behave similarly to many of the cellulose creams.

I

Acid stearic	20
Sodi carb	2
Glycerine	6
Water	78

II

Lanette wax	10
Arachis oil	20
Vaseline	20
Water	50

Recently the alginates have found favour as mucilaginous films which dry quickly and these can be improved still further by the addition of triethaneolamine and oleates, but again, the requirements are not fulfilled.

Much has been written about the hydrogen ion concentration, without taking into account that the pH of the skin or sweat varies throughout the day according to the type of food eaten and the amount of fluid consumed. The pH has been reported by many workers to vary between 4.2 and 7.5. A barrier cream must be impermeable to the chemical which it is to keep off the skin, yet it can and must be a permeable film when dry. Cellulose films of varying thicknesses will resist the penetration of many chemicals, but under certain physical conditions, they will permit the passage of water-soluble salts in solution. If a strip of cellulose is placed between two solutions, the weaker solution will pass into the stronger. This osmotic pressure is a factor to be considered in the manufacture of barrier creams because the perspiration should pass through the protective film whilst the latter resists the penetration of stronger solutions of acid, alkali and other chemicals.

From between 700 to 900 c.c. of sweat are excreted every 24 hours, sometimes slightly alkaline and with a specific gravity of about 1.002 to 1.004. Sweat glands are found everywhere except on the lips, nail bed, and glans penis. Their function is the control of the oxygen-carbon-dioxide metabolism of the skin, regulation of the temperature and alkali reserve excretion of waste products, etc. Sweat keeps the skin soft and supple and its fungicidal action is due to the presence of acetic, proprionic, caproic, lactic and other acids.

It follows, therefore, that the gum solution barriers should be condemned, even though they are rarely used, and the pore blockers should be deleted from all protective creams.

ESTIMATION OF PROPERTIES

There are two methods at present generally used to estimate the protective properties of these creams.

METHOD I

Smear a thin film of barrier cream on to paper, apply the hazard and, 12 hours later, carefully remove both hazard and barrier cream. Test the paper by chemical means, when any penetration will be immediately observed. A titration will

also give the percentage of hazard which has penetrated the barrier.

METHOD II

Dry the barrier cream out on a glass tile. Curl it off with a fine knife and immerse in the hazard, which is usually contained in a test-tube. Should the barrier dissolve, or should diffusion occur in the curl of barrier cream within 4 hours. no claim should be made for protective properties.

These methods are only impressionistic because, by observation, they fail to give any indication of friction effect or osmotic pressure and above all deposition or wear, due to contact under working conditions. It is only by reproducing, as accurately as possible, the actual conditions of use of protectives that reliable indication of their effectiveness can be estimated.

A scientific approach to skin protection has unfortunately been neglected, probably because physiological and biochemical considerations have been overlooked, so it is now intended to present a few facts on the evaluation of protective creams by penetrations observed under fluorescent light—a technique first introduced by the Medical Research Council, Industrial Medical Research Unit at Birmingham Accident Hospital.

Small quantities of oils and chemicals are invisible on the skin and their effective removal cannot be estimated by visual examination. Mineral oils produce a brilliant violet flourescence when subject to ultra-violet light, and by adding minute quantities of fluorescent chemicals to other substances, the technique of penetration with oil can be applied to nearly all industrial hazards.

The source of ultra-violet light was an analytic mercury arc model, screened with Wood's glass, the lamp angled at 45° and the arm held at approximately 12 ins. from the lamp and camera which was focussed from above. Photographs were taken on Super XX Plates with an exposure of 45 seconds at F.6.3 and the lens covered with a gelatine filter to cut off reflected radiation from the arm.

METHOD

It is impossible to measure accurately the thickness of a barrier film on the skin, but by applying a known weight of barrier cream over equal areas, the approximate thickness can be calculated. The method is open to error, but variations are comparable to those occurring when the cream is used under actual working conditions. Three equal squares were marked out on the extensor surface of the forearm, each covering 1 sq. inch, and 2 grains of each of three well-known barriers applied—the central patches of unprotected skin act as controls. When dried, a measured drop of mineral oil was applied to each square, care being taken to prevent overlapping.

The arm was left for 20 minutes while ordinary laboratory duties were performed and then washed and dried with soap and warm water in the ordinary way. The thickness of barrier cream was estimated to be 100 microns.

The fluorescence demonstrates the fact that these three barriers were ineffective in resisting the penetration of mineral oil. By repeating the experiments, it was found that resistance increased in proportion to the thickness of the barrier film, but the films were too thick for use under working conditions.

Barrier I.—Soap—Gross penetration.

Barrier II.—Vanishing Cream type—Gross penetration.

Barrier III.—Unsaturated Fatty Acid type—Reduced fluorescence.

The oil globules have not penetrated into the hair follicles, but the hairs are definitely contaminated and this is signal-

ficant, further experiments have shown that by increasing the unsaturated fatty acid content, complete protection can be achieved. Many hazards have been subjected to similar experiments with all barrier creams at present available to industry and with a number of new, untried formulae, including the polyvinyl alcohols and acetates, polystyrene, etc.

Barrier creams of known makes were smeared on parchment to a depth of 1/1,000 in. and a measured drop of the hazard applied to each. The hazard contained a fluorescing chemical to the extent of 1 part in 1,000 in each case.

A number of experiments were conducted by this method and again, it was most marked that the higher the unsaturated fatty acid content, the greater the resistance of the barrier to a wide range of hazards.

MOULD GROWTH

Mould growths occur in many barrier creams and are a constant source of worry to the manufacturer. Although some authorities have recommendtd the incorporation of 1 part in 1,000 of chlorocresol, it is not advisable to use this because, like the chloro-xylenols and the phenols, it tends to produce dermatitis and in certain industries is a very definite hazard.

The spores and their mycelliums, infecting most barrier creams, belong to the penicilliums and aspergillus. Most are resistant to dry heat, even at 120°C., and against antiseptics which are accepted as being harmless to the skin, such as sodium-ethyl-mercuric-thiosalicylate and the esters of para-hydroxybenzoic acid are effective only in high concentrations and cost usually precludes their inclusion. The mercurials for instance, require a concentration of 1 part in 7,500 to prevent contamination and the benzoic derivatives are much higher; even this concentration will not prevent mould growth if the raw materials are already contaminated.

In the presence of moisture, spores are destroyed at 60-65°C.

The spores will develop in all barrier creams containing fatty acids, stearins and certain emulsifying waxes. In each case, contamination is usually present in the raw material and kaolin is very often grossly contaminated. Therefore, where possible, the raw material should be steam heated for half-an-hour at 60-65°C to prevent trouble occurring in the finished product.

SUMMARY

Barrier creams in general have been discussed and new methods of estimating their protective properties suggested, both of which are likely in future to become standard techniques for protective evaluation.

It has been demonstrated that the fatty acid type of barrier cream at present gives greater protection against the number of hazards selected, than do other types, particularly those of the vanishing base which appear to be useless against most of the hazards encountered in industry, and this applies to the soaps and soap filled barriers.

Cell destruction ultimately occurs either from the hazard used, or the cleansing material employed at the end of the day's work, due to contact and penetration into the epidermis of the hazard. It may well be that unsaturated fatty acid replacement is the line of investigation to follow for the purpose of producing a barrier cream which will be resistant to most causative agents and, at the same time keep the skin in good condition, because a healthy skin, like a healthy body, is less prone to disease.

—R. G. WRIGHT IN CHEMICAL PRODUCTS.

—PAINTING ON GLASS

DURING recent years a vogue for hand-painted glassware has become apparent, and while the subject is not strictly a modern conception, it has sufficient novelty to justify its discussion.

There are various types of painted glasswares but as the methods are all alike, the following description will serve to demonstrate the principle and introduce the reader to an inexpensive means of making attractive presents, objects of art for the home or for private sale.

MATERIALS AND APPLIANCES

The painting on glass is satisfactorily done with ordinary good-grade enamel; the most convenient way of obtaining supplies is to purchase it from the market.

Brushes are preferably sable of fitch and, as a rule, the smaller size of round brushes are most convenient to handle. A number of such brushes is generally required to save time and annoyance of repeatedly washing them in turpentine to clean out one colour before using another.

SELECTION OF GLASSWARE

Ready-made glassware of appropriate shape and size suitable for the purpose; usually a plain piece is preferable to one that is embossed or chased, but the latter can be used if they are otherwise suitable. In the latter case the design must incorporate the chased or decorative work on the glass, whereas when the surfaces are plain there is much greater freedom for originality of design.

PREPARATION OF DESIGNS

Although the design may be of any character that pleases the worker, there is much in favour of a simple floral treatment.

Having settled the form of the design, proceed to make a drawing of it, of such a size that it can be repeated three or four times on the glass; then make the requisite number of tracings on to pieces of thin semi-transparent paper.

APPLYING DESIGN TO GLASS

The next step is to paste the designs to the inside of the glass bowl, placing them equally and keeping them nicely in line.

As soon as the paste has dried, clean the outside of the glass so that it is quite free from any trace of grease, then commence the painting.

There are not hard and fast rules to follow with the painting; the enamel is applied in the ordinary way, but should be worked with particular care.

Do not use too much paint, or it will run; on the other hand, too little paint will impart a streaky appearance and the colour will not be opaque. If necessary, add a few spots of turpentine to the enamel to make it thin enough to work with a certain "fattiness" of touch.

PAINTING THE GLASS

Economy of time and paint results from the use of one colour only, applied where needed to the glass, but when this method is adopted take care not to touch any of the wet paint while handling the glass.

As the outline of the design shows clearly through the glass, no difficulty is experienced in obtaining a workmanlike effect, even at the first attempt.

After the first coat of paint has dried thoroughly hard, remove the design sheets by wetting them, and wiping away all traces of paste with a warm, wet rag.

Next proceed to paint the top edge of the glass by applying enamel to it in a

fairly generous but even coat, then with a piece of rag wrapped around the finger, wipe the faces of the glass, firmly but briskly, so as to remove any traces of the paint that may have worked downwards.

A few black lines painted on the inside faces of the glass feet on the fruit dish add considerably to the appearance.

FINISHING TOUCHES

Hold the glass to the light and inspect it thoroughly to see that the paintwork is perfect throughout; if not, go over any defective parts with a fresh coat of enamel.

Should a mistake have been made at any stage of the work it can be remedied by wiping off the enamel with a piece of rag, then cleaning the glass with a clean rag moistened with turpentine, and afterwards painting in the design afresh.

The flower vase is treated in the same way, but in this case the foot is edged with colour as well as the rim.

Should a decorated glass have been used, the embossed or patterned parts can be coloured and the surfaces left plain.

ADDING EMPHASIS

Special points of the design may be emphasised when required by thickening the enamel by adding to it a small amount of whiting ground in oil. It is best to mix a small quantity on a palette or piece of smooth wood and to apply two or three coats to the glass rather than attempt too much with one coat.

This method is especially pleasing when working along the famous Wedgwood blue designs, with raised figures in ivory colour. In such a case the figures are worked on the outside of the glass in the manner just described, and afterwards the whole of the interior is painted blue, applying several coats if necessary to obtain the required opacity or denseness.

A final coat of varnish is often a help, and renders the interior almost as smooth and easy to clean as the natural glass.

Instead of using opaque colours, it is possible to use the transparent colours prepared for the colouring of lantern slides; they are much more difficult to apply evenly; but some delightful effects can be obtained, especially when applied to a cathedral glass, to ground glass, or to some of the opalescent electric and gaslight shades now on the market.

—Application of Glycerin in Glass Industry

THE march of events has made profound changes in modern glass industry. In many instances these changes have been played by glycerin and its derivatives making glass more useful and valuable. This unique fluid finds use, not only in the manufacture of the newer materials, such as "Safety" glass, but is also a valued ingredient of such standard substances as etching compounds, anti-fog and anti-rust products, glass polishes, glass marking inks and the like.

Among the most widely utilized of the glycerin derivatives are the synthetic glycerin phthalate resins, referred to as alkyd or glyptal resins. Alone or in combination with other materials these glycerin containing resins have found important uses in the manufacture of laminated or safety glass. In the past unmodified alkyd resins were employed and showed strong adhesive powers and resistance to moisture, but had the disadvantage of eventually becoming brittle due to polymerization. This disadvantage has been overcome, and other desirable properties imparted to these resins by the use of oils or fatty acids as modifying agents. A typical alkyd resin of this sort may consist of:—

Glycerin	94	parts by weight.
Phthalic anhydride	148	" "
Castor oil fatty acids	40	" "
Corn oil	100	" "

Quite frequently sheets of flexible alkyd resin are used for uniting two sheets of glass, but more often these glycerin-containing products are employed as bonding agents for uniting glass sheets with intervening transparent materials, such as cellulose ester compositions.

A resin-like product for laminating glass can be made by heating together glycerin, and a protein, such as casein; and adding phthalic anhydride to the reaction product with further heating. An adhesive for similar uses may be prepared by heating together casein, glycerin and caustic soda. Coagulate calcium alginate films are washed free of soluble salts with a glycerin solution, prior to use in making non-shattering glass. Glycerin likewise enters into methods for emitting celluloid or the like to glass in making compound glass. Newer laminating materials, such as polyvinyl alcohol, similarly employ glycerin or glycerin aldehydes which serve to give improved adhesive properties.

When gelatin is employed as a laminating agent for making safety glass, glycerin is a standard adjunct material. In one case, a glycerin solution containing 15-25% of acetic acid is coated on the glass sheets prior to their union with gelatin by pressure. Pegler, in a series of patents, advocates the employment of glycerin as a plasticizing agent for gelatin sheets used for making non-shattering safety glass. Others similarly advocate glycerin as a plasticizer for gelatin glass laminating films.

Glycerin derivatives, particularly glycerin triacetate or triacetin, which is widely used as a camphor substitute, are employed as plasticizing agents for transparent glass-laminating agents such as cellulose acetate, cellulose nitrate and similar cellulosic derivatives. Glycerin diacetate or triacetate is also recommended as a plasticizing agent for polyvinyl-esters similarly employed in compound glass manufacture. Glycerin formal has likewise been advocated as a plasticizer for similar polyvinyl resins used in place of glass.

[illegible] advantageous [illegible]. These cements, the composition of which may be varied by the addition of various other substances, set rapidly to an almost incredible hardness and strength.

Glass-etching processes frequently make use of one or more properties of glycerin. Stout recommends glycerin as a glass grinding fluid, inasmuch as it has sufficient body to carry the emery or other abrasive, and furthermore, being water-soluble, the ground glass surfaces are easily cleaned. It may also be mentioned that glycerin is used for rendering ground glass temporarily transparent. Glue-glycerin sheet compositions are used as stencils in sand etching glass. The sheet is applied to the glass and the design is then cut into the glue sheet, which is strong and resilient enough to withstand the sand-blasting action, but the particles readily etch the glass in the desired design. Glass-etching fluid in which a fluoride is the active chemical ingredient, use glycerin as a constituent. To prepare one type of glass etching paste, ammonium bifluoride is mixed with just enough water to dissolve the crystals. With this, a quantity of glycerin equal to half the volume of the liquid is mixed, and then calcium sulphate added until the mixture thickens to a thin paste. A similar glass etching paste consists of:—

Glycerin	4	parts by weight.
Gum Karaya	2	"

These are rubbed together well and the following ingredient is worked in:

Ammonium fluoride, (Concentrated Solution) 94 parts by weight.

It is hardly necessary to point out that all of these fluoride containing [illegible]

[illegible]

A glass [illegible] on a fluoride [illegible] is [illegible] follows:—

Barium sulphate	15	parts by weight
Ammonium bifluoride	15	"
Hot water	12	"
Oxalic acid	8	"
Ammonium sulphate	10	"
Glycerin	40	"

The viscosity may be adjusted by adding water. An ordinary steel pen may be used for writing on the glass which should be slightly warmed. The ink is allowed to act for about 2 minutes, then it is washed off with hot water and dried. The pen must also be washed. The addition of about 2 per cent sodium fluoride speeds up the action and improves the ink.

Another glass marking ink, [illegible] colour, which is [illegible] glassware, [illegible] objects, is made by [illegible] chrome oxide [illegible]. These are [illegible] a solution [illegible] of equal parts of alcohol, water and glycerin, the amount of liquid used depending on the consistency desired. The ink is applied with a pen and allowed to dry. When dry, it is fixed by slowly warming the glass in a [illegible] it is heated to [illegible]. The glass is then slowly cooled, [illegible] yellow flame to [illegible] and so prevent unequal stresses and strains in the glass.

According to a patented process polished glass articles such as lenses, mirrors and the like, may be marked for identification by means of a suitable glycerin phthalate paint. [illegible] so marked are then heated until the paint is polymerized to the

[illegible] Glycerin is also some[illegible] used in glass-lettering paints to prevent excessive drying, cracking or chipping. For the same reason, glycerin is added to coloured waterglass or gelatin solutions used for tinting electric-light bulbs, globes, and similar glass objects.

Glycerin solutions are of marked value in protecting glass windows during spray painting. It has been proved that a solution of glycerin and whiting is far superior, both from the angle of cost and efficiency, than any other material tried.

A glass-marking [illegible] for [illegible] while painting automobiles may be made with:—

Kaolin	5.0	parts by weight
Glycerin	1.5	„ „
Butyl alcohol	0.25	„ „

This is applied to the automobile glass with a brush and allowed to dry. After the spray painting, the mark may be easily removed with a cloth, a pretty knife or by washing with water, having the glass free of paint.

CULTIVATION OF BLACK PEPPER

BLACK pepper is a spice of considerable importance and varying quantities of this are consumed by the Indians. On an average the consumption per family may be put at two seers per year. It is also used as an adjunct to several Ayurvedic medicines. The following extract from *Indian Farming* will give an idea about its cultivation.

CLIMATE AND SOIL

The climate and the soil of the moist parts of Mysore, Malabar, and Assam lower are suitable for the culture of this crop. It can be successfully grown both in the homestead to meet the requirements of separate families and also on a large scale to meet the demands of the trade. Like betel leaf (pan) plant it can be extensively grown in the hills and the hill-rocks and also in parts of lower Bengal where the conditions are very similar to other pepper growing places. We therefore expect the attempt to grow pepper in the deltaic districts of Bengal is sure to succeed.

The black pepper is the dried fruit of piper nigrum L. belonging to the family piper aceoc. The plant is a large woody climber but under cultivation the growth is restricted. The flowering catkins are from 1 to 6 inches long and $\frac{1}{4}$ inch in diameter, each bearing about 60 pepper corns when mature.

There are three varieties of black pepper plant: Some plants simply bear male flowers (Staminate), other only female one (Pistillate), while still a third possess and lowers with both stamens and pistils, but the former are developed so sparsely as to mitigate the chances of fertility. In choosing vines for propagation, it will therefore be necessary to first determine whether the plant is a bisexual one and fully provided with stamens. It may be taken as a rule that any vine fully provided with stamens in flowers will give a good crop, while one not so provided will be capricious in its behaviour, being dependent on its neighbours for the swelling of its berries.

The berries are a dull green colour turning red as they ripen. Beneath the red skin is a thin layer of pulp which encloses the round white seed.

The pepper plant grows naturally in the decaying leaf mould formed in the forests. When under cultivation it grows on a variety of soils but, where humus is absent, it needs heavy manuring with organic manures and composts to give satisfactory yields. The plant being a vine needs support. It is usually allowed to grow up arecanut plants of mango, jackfruit, and other garden trees.

PROPAGATION

The propagation of the pepper vines is usually undertaken from cuttings, though it may be raised also from seeds.

Cuttings:—Strong cuttings 1 to 2 ft. long, with lateral branches, taken from the upper part of the bearing vines, are used. Smaller cuttings will grow but will take a longer time to become established. The most satisfactory method of raising plants from cuttings is to plant them in nursery beds. Cuttings planted directly in the field, unless conditions are very favourable, frequently die or fail to grow for many months. The cuttings take root in about three months and are lifted during the rains for transplanting. Nursery beds should be in a sheltered situation with good drainage. In dry weather frequent watering is necessary. The ground is well dug, finely pulverised, made into bed and shaded with leaves or thatching grass.

[illegible] collected locally and sown in boxes gave 90 per cent. germination. In three months time from date of sowing, many of the seedlings reached a height of 8 inches and were sufficiently large to be planted out. There are, however, two objections to propagation from seedlings: the possibility of plants not coming true to type and the possibility of a longer time being taken by the time vines commence fruiting. It is therefore desirable to employ cuttings in preference to seed when the former are available.

PLANTING

Planting out in the field is usually done at the beginning of the rains. When the cuttings are ready for transplanting they are lifted from the nursery beds and planted at the foot of the trees on which they are intended to grow. As a rule one plant only is placed along the side of each tree and at first it has to be carefully tied to its support.

MANURING

Like betel leaf (Pan) plant it requires liberal manuring. Cow-dung and household refuse are used and applied at the end of the rains and at intervals throughout the cold weather. The manure is simply heaped round the base of the tree on which the vine climbs. It appears that well-rotten cow-dung, composts and oil-cake combination would be a very suitable manure for this plant. It is desirable that the manure after application should be hoed up and mixed with the soil. In Bombay a special manure is made from green leaves and twigs plucked during the monsoon, and used as litter in cattlebyres and thence removed, together with the dung and urine of the cattle, to a manure pit daily or every second day. This manure is sufficiently decayed by the following March and is applied in that month or in April. Fish guano at the rate of a quarter to one pound per vine [illegible] and one pound of lime mixed with [illegible] lbs of leaf mould per vine are also recommended.

EARNING AND YIELD

The vines begin to bear in 3 to 5 years after planting and continues to fruit for at least 20 years. It flowers in May and the berries are plucked in December when just beginning to ripen.

The highest output in Assam that can be obtained from a single vine is about three seers of dry cured pepper and the average yield is about one seer per each vine in a plantation. In Bombay the vines in full bearing are known to yield about 24 seers of dried pepper. The low yield in Assam may be ascribed to the selection of vines which are not fully provided with stamens in flowers to ensure fruit formation and to inadequate manuring. By selection of proper vines for planting and adequate manuring it has been able to obtain an yield of 3 to 9 seers of dried cured pepper per vine and it is felt that by taking recourse to these methods the yield can be appreciably increased.

PREPARATION

Preparation of the berries is a simple process. Ordinarily the bunches are plucked when the berries are green or changing colour. If intended for the cultivator's own use, the berries are boiled in water for a few minutes to soften the husk, which is then removed by rubbing over a bamboo basket. If meant for the market, they are simply dried in the sun after boiling and allowed to retain the husk, which assumes a black colour.

COST OF PRODUCTION AND PROFIT

The cost of cultivation being low it is a profitable crop. Raising of cuttings, jungle clearing and planting cost Rs. 200/- per acre. Thereafter Rs. 250 are spent annually for keeping down the weeds, manuring and working the soil.

[illegible] and [illegible] cost Rs. 50/- per acre.

The amount of profit will depend on the number of vines that can be planted in an acre and the yield reaped per vine. The number of vines that can be planted in an acre will depend on the number of trees available to be utilised as supports for the vines. If natural supports are available or if supports are provided at distances of 20 ft. then 2178 vines can be raised in an acre, if the planting distance is increased to 40 ft. the number of vines that can be raised per acre would come to 1089. For an estimate of probable turn-out it would be safe thus to state that 1000 vines can be planted in an acre. Now taking one seer as the average yield of dry cured pepper per vine as stated above the total yield would work out to 1000 seers. Under the prevailing wholesale price of Re. 1/- per seer this would mean a gross return of Rs. 1000. Paying Rs. 500 for the cost of production as stated before it is expected to have a net profit of Rs. 500 per annum per acre of cultivation.



PHARMACEUTICAL RECIPES

ULCER OINTMENT

Oil of eucalyptus	14	parts.
Colophony	20	,,
Soft paraffin	55	,,
Hard paraffin	11	,,
Green colouring matter—trace.		

Mix thoroughly in a porcelain mortar and put in printed tin boxes. This preparation will not only be efficacious to ulcers but also to all skin diseases, cuts, bruises, eczema, etc.

DIGESTIVE POWDER

Chebulic myrobalan	1	part.
Emblic myrobalan	1	,,
Ajowan	1	,,
Aniseed	1	,,
Ginger	1	,,
Rock salt	1	,,
Caraway	1	,,
Common salt	1	,,

Mix in fine powder.

Dose —1 to 2 teaspoonfuls after food.

UNIVERSAL LINIMENT

Oil sassafras	4	dr.	10 drops.
Oil camphor	2½	oz.	
Oil of thyme	3	dr.	20 drops.
Methyl salicylate	100	mins.	
Oil terebinth	10	oz.	

Mix and add colouring matter, if required This is a good pain relieving liniment.

PTYCHO-SODA TABLET

Sodium bicarbonate	5	lbs.
Oil of Thymol	½	oz.

Thoroughly well granulate the soda and incorporate with thymol. The die for the tablet is 5/16th inch and each tablet weighs 5 grains.

PLASTER OF BELLADONA

In making plaster of belladona first prepare lead plaster with the following formula·—

Litharge	5	oz.
Olive oil	10	,,
Water	6	,,

Boil all the ingredients together gently by the heat of a steam bath, and keep them simmering for 4 or 5 hours, stirring constantly until the product acquires the proper consistency of a plaster, adding more water during the process if necessary.

Now with this lead plaster again prepare soap plaster in the following way:

To lead plaster 3 lbs., melted by a slow heat, add of castile soap, sliced ½ lb., rosin 1 oz., both liquefied by heat and constantly stirring, evaporate to a proper consistence.

After preparing proceed as follows:—

Soap plaster	2	oz.
Alcoholic extract of belladona	3	,,

Melt the soap plaster on a water bath and add the extract of belladona. Keep constantly stirring the mixture until it acquires the proper consistence.

EASTON'S SYRUP

Iron, in form of wire	8.60	grams.
Phosphoric acid, concentrated	62.50	millis.
Strychnine, in powder	0.57	grams.
Quinine sulphate	14.80	grams.
Simple syrup	700.00	millis.
Distilled water, sufficient to produce	1000.00	millis.

Dilute the concentrated phosphoric acid with an equal volume of distilled water in a small flask; add the iron and heat very gently until dissolved; add the solution to the strychnine and quinine sulphate previously triturated with 30 millilitres of the distilled water; when solution is complete filter the syrup, and pass sufficient distilled water through the filter to produce the required volume.

Dose, one to two fluid drachms.

LIVER PILLS

Podophyllin	½	gr.
Rhubarb	2½	,,
Extract of hyoscyami	2	,,
Mucilage of tragacanth	q.s.	

Triturate the ingredients in a mortar and make into a stiff dough. Then make into pills. The above composition is sufficient for one pill.

*TOOTHACHE DROPS

Mastic	15	parts.
Benzine	5	,,
Chloroform	10	,,
Absolute alcohol	40	,,
Carbolic acid	10	,,
Menthol	20	,,
Morphine	1	part.
Eugenol	9	parts.

Mix. Apply to the cavity on cotton wool. When packed fairly tightly, it hardens and forms a temporary stopping. The cavity should first be mopped dry with cotton wool.

EYE LOTION

Boric acid	2	dr.
Zinc sulphate	10	gr.
Distilled witch hazel	2	oz.
Glycerin	[illegible]	
Distilled water to make	[illegible]	

ADHESIVE POWDER FOR DRIVING BELTS

An adhesive powder for driving belts may be prepared from 1000 parts of powder soda ash, 375 parts of carbonate of magnesia, and 125 parts of finely crushed rosin. The whole being mixed together until a uniform white powder is obtained. If this powder is sprinkled over the whole surface of the belt while the engine is running at low speed, the belt will be prevented from slipping. The effect is attributed to the soda combining with the first, fat and oil in the belt, this action being facilitated by the rosin, whilst the carbonate of magnesia prevents stickiness.

CANDIED GINGER

Ginger grated	1	lb.
Sugar	15	lbs.

Water, sufficient to dissolve the sugar.

Put them into a preserving pan over a slow fire and stir them well, until the sugar begins to boil, then add 1 lb. sugar and keep stirring till it grows thick, then take it from the fire and drop it in cakes on a slab of marble; set it in a warm place to dry.

GOLD COLOURING ON TIN

Shellac	5	oz.
Turmeric	2	„
Gamboge	2	„
Dragon's blood	4	dr.
Methylated spirit	3	pints.

Dissolve the ingredients in methylated spirit and apply the lacquer on tin articles which should be thoroughly cleaned with soft soap and hot water and warmed.

CRYSTALLISED COCONUT CHIPS

Prepare the coconut kernel by passing off the brown skin. Cut them in thin slices and pack them in a crystallising tin. Now make simple syrup enough to cover them. Pour this thin syrup over them while hot and stand aside for 12 hours then drain off the superfluous syrup by removing the stopper from the tin. Spread the chips on trays and put them in the drying room for 2 or 3 days turning them over at intervals. When dry put them again into the tin; boil a like quantity of syrup as before and let it stand till nearly cold; then pour it over the chips and let them remain undisturbed for another 12 hours; then strain again and spread them on trays; when dry, they are ready for sale. This, of course, will be white. To make the chips red simply colour the syrup which is used for crystallising.

WATCHMAKER'S OIL

Stir up for some time best olive oil with water kept at the boiling point; then after the two fluids have separated, decant the oil and shake up with a little freshly burned lime. Let the mixture stand for some weeks in a bottle exposed to the sunlight and air, but protected from wet and dirt. When filtered, the oil will be nearly colourless, perfectly limpid, and will never thicken or become rancid.

MICA PAINT

Place in a crucible or retort some fragments of mica, make red hot and draw into water or boil in dilute hydrochloric acid. After either of the above processes it has to be ground in water and dried and powdered.

Now take 84 lbs. of this powder and [illegible] gallons of boiled linseed oil. Mix thoroughly. The plant is nearly transparent and is intended to be applied over other paint to produce a peculiar silvery or scaly glittering appearance, varying in different lights, and is very effective in certain classes of wood work. Small quantities of colour may be introduced into it but the best effects are obtained by its use over other colours.

MANGO MORABBA

Green mango	2	lbs.
Sugar	4	„
Lime	1	oz.
Salt	1	„

Wash the mangoes, peel and core, and cut into small cubes. Make incisions into the pieces with a pointed fork or with a piece of pointed wooden rod. Then make a solution of the lime in water and allow it to soak for 1½ hours. Take out and wash in clear water. Now besmear the mango pieces with salt, cover up with a plate and keep aside for half an hour. After this wash them in hot water and boil them in water in an enamelled pan until they are partially cooked. Then drain off the water and pour thin sugar syrup, prepared in the meantime with the sugar and requisite amount of water. Continue cooking gently until the syrup becomes viscous. Leave aside for a while and bottle when cool.

LUBRICATING OIL FOR MOTOR CYLINDERS

Castor oil	30	gals.
Engine oil (sp. gr. 880)	30	„
Benzine	30	„
Camphorated oil	10	„

Use 2—3 volumes in 1000 volumes gasoline.

JAPAN GOLD SIZE

Kauri gum	100	lbs.
Boiled linseed oil	22	gals.
Red lead	5	lbs.
Litharge	5	„
Manganese dioxide	24	„
Turpentine	45	gals.

Japan gold is used by signwriters for lettering purposes with gold leaf, also, when thinned down, as a drier for paints, enamels and varnishes.

—IN THE FIELD OF INVENTION

TEMPERATURE CONTROLLER

Entirely new instrument, based on electronic principles for automatically maintaining an electric furnace at any desired temperature, is the Towers automatic temperature controller. The instrument is operated by a thermocouple placed inside the furnace, and it consists of a pyrometer indicator graduated in degrees centigrade fitted with an additional pointer which is set at the required temperature. This pointer is connected to a Fielden Tektor meter relay circuit, and when the temperature indicating needle reaches it, the electrical capacity of the circuit is affected and a relay is operated, switching off the supply to the furnace. Similarly, when the temperature drops, the supply is switched on again. The accuracy of the Controller is largely dependent upon the length of scale of the pyrometer indicator and the type of furnace used. The standard model illustrated with a 3 inch diameter dial reading 0-1100 deg. C. used with a Towers muffle furnace, will maintain the temperature within plus or minus 10 deg. C.

A great advantage in using the controller is the avoidance of burning out the furnace, due to an oversight. The controller automatically switches off the furnace when the desired temperature is reached. It replaces the normal type of temperature regulator such as a rheostat or energy regulator, and also includes a pyrometer indicator.

The instrument is fitted in an enamelled metal case for wall mounting and is provided with indicator lamps, mains switch, fuses, thermo-couple and flexible conduit for connection to furnace.

SISAL WAX

Methods relating to the recovery of wax from sisal leaves are summarized in two patents recently assigned to a British Chemical Company (Chem. Age, 1949, 61, 212).

The first of these claims an improved process for the extraction and purification of sisal wax. The sisal flesh is extracted with an organic solvent, such as a mixture of benzene and ethyl alcohol, or trichlorethylene, at a temperature approximately the boiling point of the solvent, to extract the wax and other substances. The resulting products are treated with an absorbent, comminuted or not, to eliminate impurities. The solvent is then distilled off. After addition of absorbent to the hot wax solution, the whole mixture is subjected to hot filtration and the purified wax filtrate recovered. This is then distilled. The absorbent may be charcoal, activated carbon, alumina, bone meal, etc. It may be used in various ways; in one example, the solution is passed through a heated column containing alumina.

The second patent is broader in its title and describes the recovery of wax from plant leaves, especially of sisal, flax, jute and others. The proportion of solvent to material treated may in some cases be 5:1. The main steps consist, as before, in extracting the leaves or flesh with an organic solvent at the boiling point, or just below it. The solvent is distilled off, or the solution cooled to deposit extracts. The residue left after distillation or the deposit resulting from cooling is redissolved in the same or similar solvent. The solution may be mixed with absorbent before filtering.

MODIFIED ETHYLENE PROCESS.

A modified process for producing ethylene has been described in the U. S. by R. M. Deansley and C. H. Watkins, both of the Universal Oil Products Company. In producing ethylene from refinery gas for the production of ethylene glycol, air or oxygen is admitted to the catalytic reactors. The heat needed for the reaction is supplied by the combustion of coke form and by the reaction itself. Advantages claimed are better yields of ethylene and the possibility of using impure feed chemicals.

—Chemical Age.

ALUMINIUM SHEATHING CABLES

Equipment which promises to increase the use of aluminium to replace lead for the sheathing of electric cables and other purposes has been constructed by the Pirelli-General Cable Works Ltd., in whose research laboratories was developed the cold pressure welding process employed. Cable-sheathing by this method is claimed to be continuous, the aluminium strip being joined by brazing carried out without interfering with the welding process.

—Chemical Age.

NEW TYPE OF BOBBINS

It is understood that American Paper Tube Co., U. S. A. has developed new type of bobbins. It provides a light weight hollow core or yarn support of simple construction having a smooth exterior surface not subject to splitting or splintering, and more durable in use than wooden or other tubes. The new type consists of a tubular barrel of fibrous material and head of plastic material formed around the end of the barrel. Such barrels are particularly useful as spinning bobbins for warp yarns.

—British Rayon & Silk Journal.

DELUSTRING OF NYLON

Tootal Broadhurst Lee & Co., Manchester have developed a new process of delustring nylon fibres. It relates to the treatment of nylon, especially yarn and fabric woven therefrom, to produce dulled or delustred effects either all over the treated material or in selected parts to produce patterns. It is suggested to bring the nylon into contact with a solution of antimony trichloride in aqueous hydrochloric acid to precipitate antimony oxide on the nylon, neutralising and washing the fibre so treated. The delustring effect is claimed to be resistant to laundry washing.

—British Rayon & Silk Journal.

FORMULAS, PROCESSES & ANSWERS

HAIR CURLING LIQUID

It is impossible to render straight hair curling without the aid of the iron or paper and other curlers. But it is possible, on the other hand, to make artificial curls more durable and proof against outside influences, such as especially dampness of the air. A typical formula is given below :—

Spirit of wine	30	parts.
Borax	2	,,
Water	70	,,
Perfume as desired.		

Another useful formula follows:—

Quince seed	1	dr.
Water	8	oz.
Alcohol	½	,,
Eau de cologne	¼	,,
Bergamot oil	3	drops.

Boil the quince seed and water over a slow fire until the mixture reduces to about 6 oz. Strain through clean cloth. When cool add the ingredients and bottle.

AUTOMOBILE POLISH AND CLEANSER

2705 G. D., Karachi—Desires to know a formula of preparing automobile polish and cleanser.

A	Water	5	gallons.
	Triethanolamine	8	fluidounces.
B	Mineral oil	12	pints.
	Oleic acid	20	fluidounces.
	Abrasive—celite or tripoli	1	lb.

Dissolve the triethanolamine in water. In another container mix the oil and acid and stir well. Add "B" to "A" slowly with constant stirring. Then mix in the abrasive.

The above polish and cleanser is applied with a piece of clean cheese cloth, allowed to dry and then rubbed to a bright surface.

PHOTO ENGRAVERS' GLUE

2782 A. L. S., Gurgaon—Wants to have a process of making photo engravers' glue.

Of good photographic gelatin or high grade flexible glue, take 2 oz. and put it in a glass beaker, of about 8 oz. capacity, to which add 3 oz. of distilled water. Next dissolve ½ oz. sodium salicylate in 1 oz. of distilled water and add it to the glue and water. Let the whole stand for an hour or two and then melt the glue in a water bath with the water almost at the boiling point. Stir thoroughly until solution is complete and then allow the whole to cool for a time, after which add about ¼ dr. of oil of wintergreen. Let the mass stand overnight until the air bubles that may come from stirring, work themselves out and the solution is clear, when it is ready for use.

This glue flows quite freely at about 70°F., but below this it stiffens. It will not flow at 60°, although commercial glues are liquid at even lower temperatures. It stands to reason that the higher the melting point the tougher the glue. If you use this special glue with potassium bichromate you should have a [illegible] on your plate that will be tough and [illegible] all the etch you need to give it without [illegible] of breaking down and that can be removed after the etching with an acid, or a soda [illegible] as easily as any other glue stencil. One [illegible] in making this glue should be carefully observed : do not use cheap glue [illegible], [illegible] high-grade flexible glue that looks clear and that will bend in the fingers without breaking, or use good photographic gelatin.

GRINDING PASTE FOR VALVES

2783 P. A., Madras—Wishes to have a recipe of grinding paste for valves.

Ammonium linoleate	10	parts.
Oleic acid	1	part.
Water	50	parts.
Silicon carbide green	50	,,
Quartz powdered	15	,,

Keep wet while applying.

BLUE FOUNTAIN PEN INK

2843 N. K., Lucknow—Wants to have good formulas of blue fountain pen ink, smelling salt, etc.

Ink blue	4	oz.
Gum Acacia	½	,,
Carbolic acid	¼	,,
Hot water	2	gallons.

Mix and keep aside for a day. Then strain through cloth and put in phials.

SMELLING SALT

Ammonium carbonate	2.2	lbs.
Liquor ammonia	1.1	,,
Oil of bergamot	0.56	dr.
Oil of lavender	0.9	,,
Oil of nutmeg	0.28	,,
Oil of cloves	0.28	,,
Oil of rose	2.28	,,
Oil of cinnamon	2.82	,,

Mix in a capacious porcelain mortar 2.2 lb. of ammonium carbonate with 1.1 lb. of ammonia, cover the mortar, and let it stand quietly. In the course of a few days the contents will have been converted into normal carbonate of ammonium. The latter is reduced to a coarse powder, and perfumed with bergamot oil, lavender oil, nutmeg oil, clove oil, rose oil, and cinnamon oil. The incorporation of the volatile oils is effected by first triturating about one tenth of the salt with the oils, and then gradually incorporating with this perfumed mass the rest of the salt. In this manner a uniform distribution of the odour is effected.

NAIL POLISH

2847 V. D. S., Kanpur—Wishes to have a formula of nail polish.

Celluloid film, cut small	200	gr.
Amyl acetate	2	oz.

[illegible]	5	oz.
[illegible]	30	gr.

Clean the celluloid film by soaking it in soda solution for 2 or 3 hours, then scrape with a blunt knife. Dry in the sun. Then cut it into small pieces and weigh out and put in the mixture of acetone and amyl acetate in a well stoppered bottle. Then add the colour. Keep aside for a day or two; then strain and bottle.

STORAGE BATTERY RE-CHARGING

2873 B. S. K., Saklaspur—Desires to know the method of recharging storage battery.

When a battery is being overhauled, the cells must be connected together in series and to the charging source in relatively the same manner as if they were in the vehicle; that is, the positive (+) terminal or one group of cells must be connected to the negative (—) terminal of the next group, and the two free terminals, one positive and the other negative, must be connected respectively to the positive and negative terminals of the charging circuit but not until all of the groups have been connected in series. Great care must always be taken to have the polarities correct and the wire or cable for the connections of ample size to carry, without heating, the heaviest current used in charging.

CHARGING SMALL CELLS

For cells of the portable type, having capacities from 10 to 100 ampere hours, the normal charging and discharging rate should be about one-tenth the stated capacity, but the discharging rate may be increased to double this value, in case of necessity.

If the cells be provided with formed plates and not charged the jars should be filled with the proper electrolyte, and then charged for at least 10 hours steady, or until they boil; then they may be discharged.

In the case of unformed plates, the charging should be from 30 to 40 hours, until the cells boil, and the plates assume their proper colour.

PREPARATION OF CARBON DIOXIDE GAS

Carbon dioxide is commonly prepared from precipitated calcium carbonate or soda ash and sulphuric acid. The calcium carbonate, together with water, is placed in a closed vessel and sulphuric acid gradually added. Within the vessel a spindle fitted with iron arms is placed, and this by revolving brings the whole of the mixture in contact with the acid and ensures uniformity of evolution of gas.

SPRAYING LACQUER

2869 M. L. M., Amritsar—Wants to have a recipe of spraying lacquer.

Nitro-cellulose	10	oz.
Ester gum	8	,,
Dammar gum	6	,,
Di-butyl Phthalate	$2\frac{1}{2}$	,,
Butyl acetate	$1\frac{1}{2}$	lb.
Butyl alcohol	5	oz.
Ethyl acetate	5	,,
Ethyl alcohol	1	lb.
Toluol	2	,,

Mix.

PLASTIC MOULDING POWDER

Urea and formaldehyde are condensed by heating for $2\frac{1}{2}$ to $3\frac{1}{2}$ hours at pH 7·5-8, and incorporated with paper pulp in the ratio 306 parts of aqueous resin syrup to 174 parts of paper pulp. The mass obtained is dried in a rotary drier to 1-2 per cent. free moisture and ground with 0.2 per cent. zinc stearate, 0.1 per cent. cyclohexanol stearate (lubricants), and 1.0 per cent tri-ethyl phosphate as hardening catalyst. The addition of 1 per cent ammonium carbonate is recommended as stabiliser. It is stated that moulding powders made in this way can be stored for 6 months at 35°C without deterioration. The interesting point about this process is the use of organic phosphates as hardening agents.

Another typical recipe is as follows :—

Urea	42	lbs.
Formaldehyde (37.5 p.c.)	42	,,
Cellulosic filler	40	,,
Curing agent and lubricant and dye	1.8	lb.

TINCTURE OF PYRETHRUM FLOWER

2879 S. R. T. W., Hosiarpur—Want to have a recipe of tincture of pyrethrum flowers.

Pyrethrum Flower, in powder	5	oz.
Alcohol (60 per cent) to make	20	fl. oz.

Prepare by the percolation process.

In making this preparation the alcohol (60 per cent) may be replaced by industrial spirit diluted so as to be of equivalent alcoholic strength.

SOYA BEAN OIL

Soya bean oil is obtained by expression from the seeds of the soya plant. The yield of oil varies from 10 to 12 per cent. When heated to 260°C the oil becomes pale and remains so. It occurs as a pale-yellow to brownish yellow oil, with a slight but characteristic taste and smell. The oil contains the glycerised of oleic and linalic acid. It is slightly soluble in alcohol; miscible with ether, chloroform and light petroleum.

THYMOL

In order to prepare thymol from ajowan seeds a stout distilling vessel of cast-iron is fitted with a condenser and receiver. A fairly large quantity of ajowan seed is put into the vessel according to its capacity and a quantity of water is then poured to cover the seeds just immersed in it. On heating the oil of thyme is distilled over. It is condensed and collected in a receptacle placed in the further end of the condenser. The oil is then separated from water by decanting the upper layer.

Thymol is isolated from this volatile oil by shaking the latter with an equal volume of

[illegible] sodium hydroxide [illegible] and after several hours the mixture is diluted with 3-4 volumes of hot water. The aqueous portion, which contains the thymol in solution, in the form of its sodium salt, is separated and acidified. The precipitated thymol is dried and distilled at 220-235°C is seeded with a crystal of pure thymol and set aside in a cold place. The crystallised thymol is separated by filtration and purified by recrystallisation from petrol.

PEPPERMINT OIL

Oil of peppermint is obtained by distillation from the fresh flowering tops of *Mentha Pipperita*. Both the black and white varieties are used, the former yielding more oil than the latter, but of a less delicate aroma. The oil is rectified if necessary.

Oil of peppermint is an aromatic stimulant, and carminative. It relieves gastric and intestinal flatulence and colic, and is employed with purgatives to prevent griping. The oil acts as a local anaesthetic. Oil of peppermint may be administered on sugar.

REMOVING INK SPOTS FROM CLOTH

3011 G. L. G., Jaipur—Wishes to have recipes of removing ink spots from cloth.

To remove ink spots treat the spots with a solution of potash permanganate. This should be followed by a 10 per cent. solution of oxalic acid to discharge the permanganate and dissolve the iron tannate. Washing with weak ammonium hydroxide will insure against harmful effects of the acid reagents on the fabric.

REMOVING BETEL LEAF STAINS

To remove betel leaf stains from cloth, treat the spots with a 5 per cent solution of oxalic acid. Then cover the spots with lime paste and finally wash with water.

STERILISED WATER FOR INJECTION

3041 N. I. W., Ramachandrapur—Wants to know the process of making sterilised water for injection.

In preparing sterilised water the distilled water is first collected in glass receivers. It is next transferred to hard glass containers which are closed so as to exclude bacteria, and sterilised by heating in an autoclave or by boiling for 30 minutes; it must be used within one month of its preparation. Sterilised water for intervenous injections is distilled water re-distilled in chemically clean apparatus, the first part of the distillate being rejected and the remainder collected in sterilised hard glass containers which are sealed and sterilised by heating in an autoclave or by boiling for 30 minutes; it must be used within 24 hours of its preparation (B.P.).

BOOT POLISH

[illegible] T. C. E., Jullundur City—Wants to know a good formula of boot polish.

[illegible] wax	[illegible]	[illegible]
[illegible] wax	[illegible]	[illegible]
Hard paraffin	[illegible]	[illegible]
Soft soap	1	[illegible]
Turpentine oil	1½	[illegible]
Oil soluble dye	1	oz.

Melt the wax over slow fire in [illegible] iron pan. Next add the soap and [illegible] to dissolve. Then slowly stir in the turpentine oil and lastly dye dissolved in a little turpentine oil; when thoroughly mixed extinguish the fire but go on stirring until the mixture begins to thicken. At this stage pour in [illegible]

ETCHING SOLUTION FOR IRON & STEEL

A mixture of 4 parts of acetic acid (30 per cent), and alcohol, 1 part. to this is added gradually, nitric acid, 1 part.

GOLD ENAMELS

3211 K. T., Baroda—Desires to know a few recipes of enamels for gold.

The following are some of the formulas of enamels suitable for gold articles.

White

Crystal glass, 30 parts; dioxide of arsenic 2 parts; oxide of tin 6 parts; borax 6 parts; powder (consisting of 15 oz. tin per 100 of lead). 100 parts by weight; carbonate of potassium 40 parts, all by weight. Fuse the whole in a crucible with a small quantity of manganese. Pour it into water and after having pulverised it, melt again 3 or 4 times.

Blue

Crystal glass, 30 parts; borax 5 parts; cobalt oxide 4 parts; calcined bone 4 parts; dioxide of arsenic 2 parts; all by weight. Proceed as before.

Red

Pounded flint glass 12 parts; red lead 16 parts; borax 3 parts; flints 4 parts. Fuse in a crucible for hours, then pour it out into water, and reduce it to powder in a mortar.

For applying the enamels, reduce them to fine powder in an agate mortar. During this operation, soak the enamel in water. For dissolving the impurities which may have been formed during the operation, pour immediately a few drops of nitric acid and mix well and then wash to remove the excess.

In the meantime heat strongly the gold articles to be enamelled in order to burn off the impurities and thoroughly cleanse in a solution of nitric acid diluted with boiling water. After rinsing with pure water and wiping with a very clean cloth, it is heated slightly and is then ready to receive the enamel.

Apply the enamels with a steel tool in the form of a spatula, the vehicle being water. When the layer of enamel has been applied remove the contained water by means of a fine linen rag pressing slightly on the parts that have received the enamel. Then place it before fire to remove every trace of moisture. Thus prepared put it on a fire-clay slab and introduce in a muffle furnace to fix the enamel.

HAIR REMOVING POWDER

[illegible] R. M., Bangalore—Wants a recipe of hair removing powder.

Talc	7	oz.
Starch	7	"
Barium sulphide	5	"
Powdered Soap	1	"

Mix well, and perfume with 1 to 2 dr. of formaldehyde.

To use, mix a small quantity of this powder with water, apply over the hair to be removed. In about 3 minutes scrape off with a blunt knife and wash. If smarting apply skin cream.

PRESERVATION OF SYRUPS

The preservation of syrup as well as of all sugar solutions, is best promoted by keeping them in a moderate cool, but not a very cold place. Hence to ensure preservation of the syrup the usual practice with the manufacturers is to keep it in vessels well-closed and in a situation where temperature never rises high. They are kept better in small than in large vessels; for the longer a bottle lasts, the more frequently will it be opened and the syrup consequently will be exposed to air. By bottling syrups while hot and immediately corking up and typing the bottle over with a bladder perfectly air tight they may be preserved at a summer heat for years without fermenting or losing their transparency.

DISINFECTING FLUID

3233 S. V. R., Bangalore—Wishes to have a good recipe of disinfecting fluid.

Coaltar distillate (of sp. gr. exceeding 1.00)	100	parts.
Resin	85	"
Caustic soda lye 30°Be	60	"
Vegetable oil	20	"
Water	200	"

Liquefy the resin by the application of gentle heat. Pour in the vegetable oil (castor oil, til oil, coconut oil etc.) Now raise the temperature of the mixture to about 100°C and stir in the caustic soda lye. Boil until saponified. Add water from time to time to make up the loss due to evaporation. Then make the soap solution by adding water little at a time until the whole water has been used up. Allow the solution to cool; when cold add the measured amount of creosote oil by continual stirring.

DRY CLEANING EMULSION

3253 S. C. G., Kanpur—Wants to have a recipe of dry cleaning emulsion.

Xylol	10	oz.
Carbon tetrachloride	10	"
Diglycol laurate	7	"
Water	23	"

Add the ingredients slowly to water while mixing with high speed stirrer.

This removes oils and grease as well as water soluble materials.

DRY CLEANING FLUID

Oleic acid	45	kilograms.
Caustic soda (25 per cent solution)	27	"
Alcohol	45.4	litres.
Trichlorethylene	900	kilograms.

Saponify oleic acid with the caustic soda at elevated temperature on a waterbath. Add alcohol and reflux to clear solution. Add this clear alcoholic soap solution to trichlorethylene with stirring, and let cool.

Another excellent cleaner that will not injure the finest fabrics is as follows:

Glycol oleate	2	fl. oz.
Carbon tetrachloride	60	fl. oz.
Solvent naphtha	20	fl. oz.
Benzine	18	fl. oz.

Mix.

PENETRATING OIL

Kerosene oil	2	oz.
Thin mineral oil	7	"
Secondary butyl alcohol	1	"

Mix and keep in a stoppered bottle. This oil is very suitable for freeing rusted bolts, screws, etc.

GRAPHITE ELECTRODE

3262 R.S.P., Calcutta—Wants to have a process of making graphite electrode.

Graphite electrodes consist of amorphous carbon which has been converted to the graphitic from by heating in an arc furnace or by passing a sufficiently heavy current through the carbon itself. In actual practice petroleum coke is generally used for this purpose. This is calcium pulverised and mixed with pitch and tar which serve as binders. The amount of pitch and tar should be as small as possible. Too much use of these materials will make the product soft and cannot be shaped by the method of extrusion. The extruded electrodes have less porosity and greater mechanical strength than those by moulding.

Graphite electrodes are baked in either of the two ways already stated. In one method graphite electrodes are ordinarily baked in coal or gas-fired furnaces. They are afterwards graphitised in electrical resistance furnaces. The other method consists of loading the shaped green electrode directly in the graphitising furnace, baking it and graphitizing it in the same place.

COCOA MALT POWDER

Corn sugar	55	parts.
Malt (powdered)	19	"
Skimmed milk powdered	12½	"
Cocoa	13	"
Vanillin	½	part.
Salt (powdered)	½	"

Mix thoroughly and then run through a fine wire sieve.

CHEST-RUB SALVE

Yellow petrolatum	1	lb.
Hard paraffin	1	oz.

[illegible] oil	[illegible]	
Menthol	[illegible]	
[Cassia] oil	1	dr.
Turpentine oil	½	fl. oz.

Melt the petrolatum and paraffin wax together in a double boiler and then add the menthol. Remove from the heat, stir and cool a little; then stir in the oils and turpentine. When it begins to thicken pour into tins and cover.

GELATIN SEAL FOR BOTTLES AND JARS

Gelatin	6	lbs.
Glycerin	275	c.c.
Water	5000	c.c.
Potassium dichromate 25 p.c. solution	15	c.c.
Tricresol	50	c.c.

Put all the ingredients together in a double boiler and apply heat until the gelatin is dissolved. After this continue heating for one hour with occasional stirring. Pour the mixture into a large shallow pan and place it in the ice box until solid. It may be kept in this state until ready for use.

GLASSINE PAPER

Paper is coated with or dipped in the following solution and then hung up to dry.

Copal gum	10	oz.
Alcohol	30	fl. oz.
Castor oil	1	fl. oz.

Dissolve by letting stand overnight in a covered jar and stirring the next day.

ACETIC ANHYDRIDE

3443 V.P.A., Singapore—Wants to have a process of preparing acetic anhydride.

In the preparation of acetic anhydride the sodium acetate should be freshly dehydrated care being taken that no charring occurs during the process.

Now 50 grms. of anhydrous sodium acetate are introduced into a retort connected with a water condenser. A dropping funnel is fixed through the tubulure of the retort, and by means of the funnel 30 grms. of acetyl chloride are added drop by drop. When the addition is completed, the dropping funnel is removed, the mixture stirred with a glass rod, and the tubulure closed with a glass stopper. The retort is then heated with a luminous flame kept in constant motion. The distillate is collected in a distillation flask, the side tube of which is fitted with a drying tube containing calcium chloride. A little fused sodium acetate is added to the product, which, is redistilled from the collecting flask into a flask protected from atmospheric moisture.

It is a colourless liquid with suffocating odour.

HANDMADE PAPER

3481 C.P.J., Ajmer—Desires to learn a process of handmade paper.

[illegible] process.—

Steep about 10 seers of old rags in a reservoir in which a small quantity of lime has been added. After a day or two take out the mass and squeeze out the water from it as far as possible. The whole mass is then subjected to the process of pounding. The operation is carried on with the help of an indigenous treadmill. This is the most laborious part of the business, and takes about 8 to 10 hours to complete. The mass is then kneaded until the whole is turned into a soft consistency. After this the mass is again soaked in diluted lime solution in which some saji-mati (alkali) has been added for about 2 days, then washed in a stream of water holding it in a canvas screen. The washing is continued until the washed water is clean.

The pulp thus prepared is now mixed thoroughly with a large quantity of water contained in a large earthen tumbler. Now a fine sieve fitted in a wooden frame is dipped into this solution, in which the pulp is now suspended in a state of fine division and is carefully taken out. The sieve with the homogeneous layer of pulp on it is detached from the frame, turned over and lightly pressed against a sheet of paper. The sieve is then carefully taken away leaving the newly formed sheet of paper.

The sheet is now carefully detached and exposed to the sun to dry. When dried, it is trimmed and then sized with a thin layer of starch solution. This is then thoroughly dried. The paper is now stretched on a wooden board and rubbed with a cylindrical piece of stone, and is then ready for the market.

PLASTIC ETCHING

3361 M., Meerut—Wishes to have a method of etching plastic.

Although certain plastics can be etched with alcohol, acetone, benzol, caustic alkalies and moder:: hydrocarbon solvents, the most reliable method of plate making with synthetic resins (plastics) is by direct moulding from relief or intaglio etchings.

The wide range of plastics and the different chemical nature of such materials render difficult any specific formulae for the purpose.

STAMPING INK FOR PLASTIC

Gum arabic	0.1	parts
Water	4.0	"
Glycerin	4.37	"
Formalin	0.03	"
Ultramarine blue	1.5	"

Mix.

[illegible] INK

Phosphorus	¼	dr.
Cinnamon oil	¼	oz.

Mix in a phial, cork tightly and heat slowly until mixed. This ink can be read in the dark.

MAGNESIUM SULPHATE

3617 D.V.K., Tirunelveli Town—Wishes to have a process of preparing magnesium sulphate.

Magnesium sulphate may be obtained chiefly from magnesium limestone. For this purpose the limestone either simply broken into fragments or else calcined, and its constituents quicklime and magnesia converted into hydrates by slaking it with water, is treated with a sufficient quantity of dilute hydrochloric acid to dissolve out all the calcium hydrate without touching the magnesium hydrate; the residuum of the latter, after being washed and dehydrated, is dissolved in dilute sulphuric acid, concentrated to half its bulk and set aside to crystallise.

HAIR FIXER

3644 H.S.M., Amritsar — Wants to know the *formulas of hair fixer, face powder, face cream*, etc.

Dissolve 20 grams of boric acid in a litre of rose-water; add 50 grams of pulverised gum tragacanth. After several hours, heat the mixture on a water-bath and filter through gauze. Perfume with 5 grams of oil of rose geranium and 2 grams of phenyl ethyl alcohol and finally add 100 grams of tincture of benzoin. Triturate in a stone or porcelain mortar and pour into pots.

FACE POWDER

Rice starch	30	oz.
Maize starch	20	„
Kaolin	10	„
Talc	10	„
Zinc oxide	20	„
Calcium carbonate	10	„
Orange chrome	½	„
Heliotropine	½	„
Bergamot oil	1/5	„
Ionone alpha	1/5	„
Ylang ylang oil	1/10	„
Sandalwood oil	1/10	„

Mix.

FACE CREAM

Stearic acid	180	parts.
Hard paraffin	20	„
Potassium-carbonate	13	„
Glycerine	50	„
Distilled water	750	„
Bergamot oil	2	„
Lavender oil	[illegible]	
Ylang-ylang Oil	[illegible]	
Vetivert oil	[illegible]	
Geranium oil	3	parts.

Dissolve potassium carbonate in 250 grams of water. Then take the remaining quantity of water and pour into it the glycerine. Next take an enamel vessel and put it over waterbath. Then put into it the stearic acid. When it is melted slowly pour into it warm solution of potassium carbonate. Continue stirring and then pour the remaining water, which is also warmed to 70°C. *Go on stirring for some time.* Then remove to congeal. Then mix the essential oils and keep aside for 3 or 4 days after putting a cover over it. Lastly put in phials.

INSTANTANEOUS PHOTO PAPERS

3675 S.M.S., Amraoti—Wishes to know a formula of preparing instantaneous photo papers.

Float the paper on a solution of 500 parts of distilled water and 20 parts of corrosive sublimate, then dry it and wash with a solution of 5 parts of nitrate of silver in 60 parts of distilled water. The negative is put over this prepared paper and exposed to the light for 2 seconds to 1 minute. The picture is developed by immersion in a bath of 1 part of sulphate of iron, 1½ parts of vinegar, and 30 parts of distilled water. The positive picture is then washed and mixed with sodium hyposulphite.

BLEACHING SHELLAC

3741 D.K., Navsari—Desires to know a process of bleaching shellac.

Bleached shellac is prepared in several ways. One method is to boil ordinary shellac in a weak solution of carbonate of potash until it is dissolved, then to pass the chlorine gas through the solution. When the lac is thrown down free from colour the resin is collected, washed with warm water, melted over water, and by working with the hands made into the form of more or less twisted cylindrical pieces having a marked fibrous structure.

Another method which is followed is to treat the shellac with a weak solution of potash at such a temperature that it is softened and then to work the lac with the hands until it has lost its colour and has acquired the fibrous appearances usual with bleached shellac.

It is mainly used in making white varnishes. Its properties are the same as the ordinary shellac; but it gradually deteriorates, becoming very brittle and insoluble in alcohol and in alkaline solutions.

BRIEF QUERIES AND REPLIES

Questions of any kind within the scope of Industry are invited. Enquiries or replies from experts will be published free of charge in serial order. Questions are replied by post on receipt of As. 8 stamps for each question. Subscribers outside India are requested to send International Reply coupons for each question. In order to facilitate the work of Editor's Department and to help prompt action the readers are requested to send enquiries in separate sheets.

567 B.I.W., Lucknow—Following is the process of manufacturing double boiled linseed oil: Take 1 ton of raw linseed oil in a capacious iron tank having an arrangement by means of which air can be blown into the oil from below. Heat the oil to 219°F and then put into the oil very steadily a solution of manganese sulphate prepeared by dissolving 2½ lbs. of manganese sulphate in 1 lb of water. After the manganese is put into the oil and there is no froth on top of oil then slowly put in 15½ lbs. of ground litharge. As the froth goes away below air into the oil by means of an air pump or by any other means. Also raise the temperature of the oil to about 260°F. A good air pump should finish the oil in 5 to 6 hours. Take out samples of oil and put it over a glass plate. If it dries up in a short time, you will conclude that the oil is finished. Stop blowing air and set aside the oil to cool somewhat. Then pour into sealed containers.

569 M. S. R. R., Coorg—Wire nail making machines may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. For wire enquire of Balmer Lawrie & Co., Ltd., 103, Netaji Subhas Road, Calcutta. For Barbed wire making machine enquire of Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta.

574 S. W., Madras—You may mix the ingingredients and keep for a fortnight for maturing. Then pack air-tight and sell in the market.

576 K. S., Aligarh—We have not received sample of sagi sent by you. Process of manufacturing shaving alum will appear in due course.

578 R. C. P., Hoshiarpur—For technical book enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East and W. Newman & Co. Ltd., 3, Old Court House Street; both of Calcutta. Process of manufacturing synthetic perfumes, flavours, etc., will appear in due course.

579 T. K. S., Salem—For wool spinning machines enquire of W. H. Brady & Co. Ltd., Mercantile Bldgs., Lall Bazar and Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension; both of Calcutta. Wool may be had of Gopikissen Ratanlal, 39, Armenian Street, Calcutta and Lakhmichand Kaluram, Kalimpong, Dajeeling.

581 S.C., Benares City—Thread ball making machines may be had of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta. Thread may be had of Acme Thread Co, 37, Canning Street, Calcutta and Bengal Sewing Cotton Co., 11, Parshi Church Street, Calcutta.

582 A.S.N., Behala—Following is a list of homeopathic medicine dealers: American Homeopathic Hall, 147-1, Bowbazar Street; Boericke Homeo Pharmacy, 85, Netaji Subhas Road; C. Ringer & Co., Norton Bldgs., Lall Bazar, Hahnemann Publishing Co., 165, Bowbazar Street, King & Co., 90-7A, Harrison Road, M. Bhattacharyya & Co., 84, Netaji Subhas Rd. ` Sett Dey & Co., 40A, Strand Road; all of Calcutta. Complete list will be found in Industry Year Book & Directory, published from this office, price Rs. 16-4 including postage.

590 D.F.D., Hissar—Process of manufacturing bonemeal will be found in Manures and Their Application published from this office, price Rs 2. For machines enquire of Marshall Sons & Co, Ltd., 99, Netaji Subhas Road, Calcutaa.

592 P.G.P., Trichi—Following is a list of homeopathic medicine dealers: American Homeopathic Hall, 147-1, Bowbazar Street; B. C Dhar & Bros Ltd., 81, Netaji Subhas Road; Boericke Homeo Pharmacy, 85, Netaji Subhas Road and Hahnemann Publishing Co., 165, Bowbazar Street; all of Calcutta. A complete list of homeopathic medicine dealers will be found in Industry Year Book and Directory, published from this office, price Rs 16-4 including postage

593 K.C P., Calcutta—Pin and clip making machines are not available in India at present. For the machines you may write to Baird Machinery Co., Bridgeport, Connecticut, U.S.A. Electric numbering machines are not available. You may however write to John Dickinson & Co, 6, Clive Row, Calcutta

595 P.D B., Chanda—We have no book on paint and varnish manufacture. You may write to Thacker Spink & Co. (1933), Ltd., 3, Espla-

[illegible] Calcutta for a book on [illegible] and [illegible] manufacture.

[illegible] S.C., Madras—For mathematical instrument box enquire of Prakash Industries, 3-8, Maharshi Debendra Road, Calcutta.

600 S.L.I.W., Kandy—Soap and candle making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta. An article on soap manufacture appears in May 1950 issue of Industry. Soap making perfumes and colours may be had of Calcutta Chemical Co., Ltd., 10, Bonfield Lane, and Ghose Bros., 50, Bara Street: both of Calcutta.

601 P.L.V., Sholapur City—You have to secure Drug Licence for manufacturing medicinal oil. You have to secure permit for other controlled goods which are required for manufacturing medicinal oil.

602 T.V., Jangaon—You may try the following formula of artificial gold: Gold 2 parts; Copper 90 parts and Silver 8 parts. All the metals used should be completely pure.

603 B.B.T., Calcutta—Rubber solution is used in some quantity by the Cycle and Motor Tyre repairer and also in various trades as a waterproof varnish. In order to prepare this article fresh raw rubber cut in small pieces is placed in a bottle of naptha or benzine in the preparation of 1 part of the former to 5 of the latter. The rubber gradually swells absorbing the solvent and eventually loses its tenacity. Now the mass on vigorously stirring or the bottle on shaking at a certain stage and this treatment repeated from time to time, an apparently homogeneous solution is finally obtained. This rubber solution is very sticky and tenacious. But if the raw rubber is not fresh it is better to masticate it in a kneading machine whereby it is reduced to impalpable paste. Now take 1 part of this paste and put it into 5 parts of naphtha or benzine contained in a suitable bottle. Shake for a while. The rubber readily goes into solution into a less viscous mass than untreated rubber. Following is a formula of rubber balloon: Rubber latex (60 p.c.) 50 parts; Casein (10 p c. solution) ½ part; Caustic potash 99 p.c. 4 parts; Zinc white 2/5 part; Flowers of sulphur 1 part; Accelerator ½ part; White oil 2½ parts; Karaya gum 1-20 part; Aniline colour 1 to 2 parts. Grind the solid ingredients all together in a mortar and then carefully stir in the solution stirring at least half an hour. Now dip wooden or glass forms into the solution and taking out have them in a drying chamber. When dry again dip them into the solution and hang up to dry. Repeat the operations four or five times so that the film on the forms becomes sufficiently thick. Then the dried forms are dipped in sulphur chloride and after 3 or 4 minutes they are taken out and hung up to dry [illegible] the rubber will be vulcanised [illegible] destroying its elastic property. [illegible] may be had of Metal Box Co. of India Ltd., [illegible] Hide Road, Kidderpur, Calcutta.

605 V.B., Pollachi—You may write to Thacker Spink & Co. (1933), Ltd. 3, Esplanade East, Calcutta.

606 P.N.G., Golaghat—You may refer your query to Imperial Dairy Dept., St. Mark's Road Bangalore.

607 K.A., Guntur—Variegated colour representation is done on cards by means of blocks or by litho.

609 R.P.H., Guledgud—Process of dyeing yarn and sizing will appear in due course.

611 B.C., Calcutta—Process of bread making will be found in Home Industries, published from this office, price Rs. 3-7 including postage. You have to invest Rs. 25,000 at least for starting the above business. Particulars regarding manufacturing processes will be found in the book. For starting an enamel factory you have to invest at least Rs. 1 lakh.

612 U.I.C., Delhi—Wants to be put in touch with the manufacturers of water meter ½" and ¾".

615 H.S.K., Bombay—You may start marking ink manufacture with Rs. 2,000 as capital and this industry has got good prospect. There is no institution where training on paper manufacture is given. You may however write to All India Village Industries Association, Maganwadi, Wardha, C.P.

616 J.P.S., Agra—Wants to be put in touch with the suppliers of sorel cement.

617 R.S.S., Bombay—You better consult a chemist expert in dye manufacture.

618 K.L.J., Kuchera—Process of refining mustard oil appeared in April 1949 issue of Industry. Process of refining sesame oil appeared in March 1948 of Industry. Process of manufacturing hair oils will be found in April 1950 issue of Industry. You may consult Cotton Dyeing & Printing published from this office, price Rs. 3-7 including ipostage.

619 P.I., Jamnagar—Following is a formula of lustre polish: Tallow 1 lb.; red oxide 2½ oz.; rotton stone 2 oz. Mix the oxide and rotton stone. Then melt the tallow and incorporate the other materials. Remove from heat and continue stirring for a few minutes more. Then pour into moulds.

624 S.V., Lucknow—Formulas of hair oil will be found in April 1950 issue of Industry. The name jujube is applied to a soft mass of acacia and sugar, without gelatin. This is generally used as a throat lubricant and for medicament. The method of making jujubes is as follows: Gum acacia 32 lbs.; sugar 14 lbs.; water 2 gallons. Warm together by steam until, with occasional stirring, the gum and sugar are dissolved. When solution is effected the preparation must be steadily heated until it attain a proper pourable consistency. When it is approaching point the colouring and flavouring materials are added the whole well mixed, and poured to the depth of about half an inch into oiled trays. The trays are then put in drying rooms for a period varying from 4 to 8 or 7 weeks, when the jujube is cut into long [illegible] diamond shaped pieces. The crystallisation [illegible]

with a blend warm syrup consisting of 24 lbs. of sugar and a gallon of water. At the end of 12 hours the syrup is drained off and the jujubes dried. For flavouring jujubes the following substances are generally used: Oil of orange flower; extract of liquorice, oil of lemon, oil of menthol, etc.

625 B.I.P.L., Berhampur—For liquid glucose enquire of Dalmia Jain & Co., Ltd., 9, Dalhousie Square, Calcutta.

626 R.K.R., Erakudi—Wants to be put in touch with the sole agents of wellknown oil engines and motor cycles.

632 A.S., Amritsar—Process of manufacturing snow etc. will be found in April 1950 issue of Industry.

633 S.N.D., Samastipur—Following is a formula of agarbati: Benzoin 100 parts; balsam tolu 50 parts; charcoal 700 parts; saltpetre 50 parts; sandalwood oil 50 parts; patchouli oil 15 parts; cascarilla oil 30 parts; musk grain 5 parts. Mix and make a paste by adding gum mucilage.

634 G.T.C., Bombay—For fountain pen engraving machines enquire of Batliboi & Co., Forbes Street, Fort, Bombay and Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta.

635 T.S.R., Ellore—Process of manufacturing paraffin wax, etc. will appear in due course.

636 S.P.M., Bangalore City—For injection moulding machine enquire of Francis Klein & Co., Ltd., 1, Royal Exchange Place, Calcutta.

637 B.D.D., Colgong—For pencil making plant enquire of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta.

641 S.V., Lucknow—Process of manufacturing golden polish for sandals will appear in due course.

644 B.R.A., Bombay—You may consult Prospective Industries, published from this office, price Rs. 3-7 including postage.

645 S.R.M., Byadgi—Wants to be put in touch with chilli merchants of Delhi, Kanpur and Lucknow.

646 N.B.S.W., Barharwa—Process of manufacturing soap will be found in April 1950 issue of Industry. Process of manufacturing biscuits will be found in Home Industries, published from this office, price Rs. 3-7 including postage. As regards training in soap write to Industrial Research Laboratory, 22, R. G. Kar Road, Calcutta.

647 K.R., Secunderabad—We are not aware of any institute where training is given on glass industry. You may however write to Benares Hindu University, Benares.

... finally. Unfused ... in ... For raw materials enquire of Calcutta Mineral Supply Co., Ltd., 31, Jackson Lane, Calcutta.

651 K.M.R., Bhimavaram—For raw materials enquire of Alfred Herbert (India), Ltd., 13-3, Strand Road and Francis Klein & Co., Ltd., 1, Royal Exchange Place; both of Calcutta.

654 M.R.R., Samalkot—For eucalyptus oil enquire of Coonoor Eucalyptus Oil Distillery, Coonoor R.S.; Crescent Eucalyptus Oil Refinery, Mettupalayam, Trichinopoly and Royal Eucalyptus Oil Distillery, Coonoor.

655 J.K.O.M., Jubbulpore—You may consult Vegetable Oil Industry published from this office, price Rs. 3-7 including postage.

657 U.F.S.I., Madras—We cannot vouchsafe opinion regarding respectability and reliability of any individual firm.

658 P.T.J., Cochin—For buttons of required description enquire of India Button Works, 152, Sandhurst Road, Bombay 4; National Button Factory, 40, Sonari Road, Vile Parle, East, Bombay 24.

659 S.M.C.W., Baroda—Following is a formula of glass cement: Isinglass 1 oz.; powdered glue 1 dr.; distilled water 2 oz.; salicylic acid 10 gr. Put the isinglass and glue in a gallipot, add the salicylic acid and the water, pressing down the isinglass with a pestle until it is soaked. Place the gallipot in a saucepan of water bring to the boil stirring until dissolved, then add acetic acid 1 oz. Mix well and pour into bottles.

660 I.M.D., Jamshedpur—For Indian Companies Act enquire of Thacker Spink & Co. (1933), Ltd., 3, Esplanade East, Calcutta.

661 J.N.R., Delhi—Process of colouring aluminium will appear in due course. You have to stamp the steel when moulding. Then you have to nickel-plate it.

663 I.N.J., Surat—You may consult The Newspaper Press Directory published by C. Mitchell & Co., Ltd., Mitchell House, 1 & 2, Snow Hill, Holborn, Viaduct, London E.C.1.

664 C.S.R., Saiur—You may consult Safety Matches and Their Manufacture published from this office, price Rs. 5-8 including postage. For match making machines enquire of Standard Machinery Co., 86-B, Netaji Subhas Road, Calcutta and Harima Engineering Works Ltd., 69-1, Belgachia Road, Calcutta.

665 I.N.D.C., Calcutta—We cannot say the carbonic co-efficient of phenyles, formula of which appeared in April 1950 issue of Industry. You have to analyse.

666 S.J.C., Mombasa—Cotton ginning machine may be had of W. H. Brady & Co., Ltd., Mercantile Bldg., Lall Bazar, Calcutta.

[illegible] M.[illegible], [illegible]—You should [illegible] pepper-mint oil in a glass phial and [illegible] the phial [illegible] sufficient quantity of ice so that the oil may freeze.

669 S.K.M., Sibpur—It is not possible to vulcanise iron.

670 N.C.S., Aligarh—For wire drawing dies enquire of Francis Klein & Co., Ltd., 1, Royal Exchange Place, Calcutta.

671 V.C.W., Ahmedabad—For boot polish carnauba wax, montan wax, beeswax, paraffin wax are used. Formulas of boot polish will be found in April 1950 issue of Industry.

672 G.C., Kharagpur—We have no book dealing with mechanical toy manufacture. You should consult an expert who will help you in starting mechanical toy manufacture.

674 G.S.G., Agra—Process of manufacturing washing soap appeared in April 1950 issue of Industry.

685 E.M.G., Salem—For tinned goods enquire of the following firms: Bengal Canning & Condiment Works Ltd., Gurudas Dutt's Garden Lane; Farm & Fruit Products Ltd., 71-A, Chakrabere Road; Ideal Fruit Preserving Co., 87, Badridas Temple Street; Imperial Fruit Preserving Co., 55-A, Murari Pukur Road: Sreekissen Dutt & Co., 128, Middle Road, Entally and Tims Products Ltd., 3-4, Rani Rashmani Road; all of Calcutta.

687 C.C.M., Coimbatore—Cane is produced in Assam. Following is a list of cane dealers: B. C. Nandy & Co., 71-K, Netaji Subhas Road; B. N. Bhesania & Co., 113-L, Netaji Subhas Rd.; James Payne & Co., 71-E, Netaji Subhas Road; G. N. Ganguly & Co., 113-M, Netaji Subhas Rd.; Green Traders Ltd., 85, Netaji Subhas Road; Singapore Cane Manufacturing Co., 137, Canning Street and Standard Cane Co., 72-1, Netaji Subhas Road, all of Calcutta.

689 E.B.R., Kharlar Road—Following is a list of catechu manufacturers: Indian Wood Products Co., Ltd., Izatnagar, Bareilly; Bahadurmal Catechu Factory, Champa and Jogendra Kumar Birendra Kumar, Najibabad.

693 K.S., Cuttack—We have no book on toy model making. You may however enquire of Thacker Spink & Co. (1933), Ltd., 3, Esplanade East, Calcutta.

694 P.L., Attari—Process of manufacturing fruit essences will be found in Manufacture of Syrup and Cold Drinks published from this office, price Rs. 3-7 including postage.

695 B.C.H., Jagadhri—For old file renovating machine enquire of Francis Klein & Co., Ltd., 1, Royal Exchange Place, Calcutta.

696 M.M.P., Kankola—For pencil making machines enquire of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta. We have no other article on pencil manufacture.

697 P.T., Bombay—For spool making machine enquire of John Dickinson & Co., 6, Clive Row and Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension; both of Calcutta.

698 S.B., Gurgaon—Photo engraving glue is manufactured from fish.

699 H.P.P., Aurangabad—Process of manufacturing [illegible] will be found in April 1950 issue of Industry.

[illegible] [illegible], [illegible]—[illegible] may be had of Metal Box Co. of India Ltd., [illegible], Hide Road, Kidderpur, Calcutta.

702 L.R., Rangoon—For hair curling you may try the following solution: Spirit of wine 30 parts; Borax 2 parts; Water 70 parts.

704 V.A.C., Kumbakonam—Market reports of shellac appear regularly in daily papers. No market report of tamarind seeds is available. For selling tamarind seeds you should advertise in newspapers.

705 M.C.S.S., Kanpur—An article on toilet preparation appeared in April 1950 issue of Industry.

706 T.N.S., Mhow—Yes, you may start a candle factory with Rs. 1,000 on small scale. An article on candle manufacture appeared in April 1950 issue of Industry.

708 G.K.B., No address—You should write to the Controller of Export for a list of exportable goods. There is no restriction for manufacturing fishing rods and other useful articles. You may export these articles to foreign countries.

709 R.J.P.C., Dhulia—Electrically operated mechanical toys are not manufactured in India at present.

711 L.C.T.C., Jodhpur—For deodorising white oil you may try the following formula: White oil 100 parts; Litharge 1½ parts; Potassium hydroxide 9 parts; Water 20 parts. Mix and agitate with water in various proportions several times, allowing the water to settle and decant.

712 G.C.K., Sambalpur—For securing loans you should negotiate with banks.

714 D.S.R.P., Salur—For the camera required enquire of Photographic Stores & Agency Co., Ltd., 164, Dharamtala Street, Calcutta.

717 H.H.A.G.M., Baghdad—Process of manufacturing chewing gum, sewing machine oil, etc. will appear in Formula Section in due course.

718 G.N.A., Chhota Ambana—In the formula of biscuit use sodi bicarb ½ oz. and cream of tartar 1 oz. in place of ammonia. Roll the dough to 1/6 inch thick then cut and bake in an oven.

719 G.S.S., Ranchi—For ebonite rods enquire of Jai Hind Rubber Products Ltd., P.O. Box 1372, Bombay 1; Universal Traders, 93, Harrison Road, Calcutta and Oriental Import

[illegible]

726 S.S.C., Bombay—Menthol crystals may be prepared by chilling peppermint oil derived from mentha piperita plant. For this purpose put a quantity of peppermint oil in a glass vessel and then surround it completely with freezing mixture of salt and ice. As the temperature of the oil diminishes crystals of peppermint collect at the bottom of the vessel. These are then taken out, pressed in folds of blotting paper and kept in airtight bottles.

727 R.C.P., Hoshiarpur—Formulas of proprietory articles are not available. Addresses of publishers of industrial books of Japan, Germany, France, Switzerland and Holland are not available.

728 N.K.J., Bara Banki—Process of manufacturing tincture iodine appears in May 1950 issue of Industry. Following is a formula of talcum powder: Talc 66 parts; Titanium oxide 8 parts; Zinc stearate 4 parts; Zinc oxide 21 parts; Magnesium carbonate 2½ parts; Perfume 1 part. Mix thoroughly.

730 V., Saharanpur—Process of manufacturing Sohan Halua will appear in Formula Section in due course. In golden ink gold powder is not used. Rather bronze powder is used.

731 R.T., Kanpur—In manufacturing ink you may use carbolic acid. Formulas of proprietory articles are not available.

734 M.S.B., Upleta—Yes, you may start manufacture of catechu in India. Process of manufacturing all kinds of catechu will be found in Manufacture of Catechu which you have already got.

735 S.V., Lucknow—Process of manufacturing solid phenyle appeared in April 1950 issue of Industry. Formulas of inks will also be found in the same issue. Chemicals required may be had of Calcutta Chemical Co., Ltd., 10, Bonfield Lane, and Banshidhar Dutt, 126, Khengrapatty Street; both of Calcutta.

737 A.T.C., Udaipur—You may consult Vegetable Oil Industry published from this office, price Rs. 3-7 including postage. For other books you require enquire of Thacker Spink & Co. (1933), Ltd., 3, Esplanade East, Calcutta. We generally charge 3 annas per each query for sending reply by post.

738 R.S.V., Ludhiana—Waxes may be had of Calcutta Chemical Co., Ltd., 10, Bonfield Lane, Calcutta and Banshidhar Dutt, 126, Khengrapatty Street, Calcutta. Perfumes and essences may be had of Ghose Bros., 50, Ezra Street, and F. N. Sarcar, 37, Canning Street; both of Calcutta. Following is a formula of bindi paste: Carmine 15 parts; gum arabic powder 5 parts; rose water sufficient quantity.

[illegible] boric acid and put in [illegible].

742 C.O., Shahjahanpur—You may consult Complete Tailoring; All About Fruits; Indian Pickles, Chutneys and Morabbas; all the books published from this office.

744 R.P.M., Jahanabad—Process of manufacturing synthetic perfume and colour will appear in an early issue of Industry. Colour may be had of Fuchsinwala & Bros., 44, Armenian Street and Champalal Agarwala, 45, Armenian Street; both of Calcutta. Chemicals may be had of Calcutta Chemical Co., Ltd., 10, Bonfield Lane, Calcutta.

748 P.T.J., Cochin—Wants to be put in touch with the importers of plastic coat buttons.

749 T.S.P.R., Ellore—All the ingredients you require may be had of Banshidhar Dutt, 126, Khengrapatty Street, Calcutta. For burgandy pitch and creosote enquire of Turner Morrison & Co., Ltd., 6, Lyons Range, Calcutta. For making strong solution of alum you should put some alum in water and when completely dissolved go on adding more alum in powder form.

750 T.V., Jangaon—You may consult Cotton Dyeing and Printing published from this office, price Rs. 3-7 including postage. It is not possible to preserve whole mangoes or custard apples. You may however try refrigerators.

751 M.C., Surat—Wants to be put in touch with the suppliers of raw sapphire materials, raw rubies materials and diamond dust.

752 R.P.H., Guledgud—Calcutta indigo is a special brand of indigo available in the market. But this is not manufactured at Calcutta. The dyeing is generally conducted at 120° to 140°F but in some cases the vats are not heated. Only coating of wheat is known as bran, it helps fermentation in dyeing. Cotton yarn is usually dyed either in the coppers or in the zinc lined vat. The evenness of the shade depends upon very much the number of dips given, as also upon the thoroughness and carefulness exercised in the wringing out of the yarn. The vats should be nearly filled to the top in order to allow the yarn to be immersed in the liquor as far as possible.

753 R.P.V., Benares—Bruise bhringaraj leaves and extract the juice by pressure. Other ingredients may be had of Banshidhar Dutt, 126, Khengrapatty Street, Calcutta. Chaulmoogra oil is extracted from Chaulmoogra seeds.

755 B.P., No address—Collapsible tubes may be had of Metal Box Co. of India Ltd., B-2, Hide Road, Kidderpur, Calcutta. Collapsible tube filling machines may be had of International Trading Co., 13, Netaji Subhas Road, Calcutta.

[illegible] G.D.M., [illegible]—Process of [illegible] chalk crayons will be found in [illegible] Industries published from this office, price Rs. 3-7 including postage.

757 S.K.G., Rampur—An article on candle manufacture appeared in April 1950 issue of Industry.

761 I.A.K., Dhrapha—Following is a list of old stamp dealers: Agarwal Stamp Co., Kurseong; Mission Stamps Bureau, Arrah; and Stamp Centre, 10, Chowringhee, Calcutta. For selling old stamps you may negotiate with the above firms. Formulas of gripe water, etc. will appear in Formula Section in due course.

762 T.S., Nandyal—Process of manufacturing scented sticks will appear in due course.

763 P.P.W., Poona City—An article on phenyle manufacture appeared in April 1950 issue of Industry.

764 M.M.S.R., Jammu—Dissolve D.D.T. powder in deodorised kerosene oil in the proportion of 1 part powder in 10 parts oil.

765 V.P.G., Banaras—For bolts enquire of Bolt Nut House, 71A, Netaji Subhas Road, Calcutta; Ambica Bolt Nut Works, 160, Foras Road, Near Municipal Workshop, Bombay and Bhattacherjee & Co., 61, Netaji Subhas Road, Calcutta.

771 T.S.R., Ellore—Process of manufacturing sodium silicate will be found in Chemical Industries of India published from this office, price Rs. 3-7 including postage. Raw materials may be had of Calcutta Mineral Supply Co., Ltd., 31, Jackson Lane, Calcutta.

772 U.I.E.C., Colombo—For fountain pen making machines enquire of Francis Klein & Co., Ltd., 1, Royal Exchange Place, Calcutta.

773 R.R., Bangalore—Following is a formula of chalk crayons: Plaster of Paris 2 parts; Precipitated Chalk 1 part; China Clay 1 part; Water q.s. Mix all the ingredients, then add water to make a dough and pour this to the mould. When dry bake over slow fire. As regards colour you should use pigment colour. For mould enquire of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

774 J.S.C.P.I., Lahore—We have no book on silk dyeing and printing. You better consult an expert who will advise you on the subject.

776 P.H.L., Kanpur—For medicine enquire of S. B. Biswas & Co., 55-62, Canning Street, Calcutta; B. K. Paul & Co., Ltd., 1 & 3, Bonfield Lane, Calcutta; S. A. Rahman & Sons, 11, Colootola Street, Calcutta; Medicine Supply Agency, 9, Colootola Street, Calcutta and Mazdas & Co., 7/1, Lindsay Street, Calcutta.

778 S.D., Chinsurah—Match industry has good prospect. For starting match factory you have to invest at least Rs. 1 lakh. Information regarding match industry will be found in Safety Matches and [illegible] C. Das Gupta published from this office, price Rs. 5-8 including postage. Match making machines may be had of Standard Machinery Co., 86-B, Netaji Subhas Road and Hazima Engineering Co., 69-1, Belgatchia Road; both of Calcutta.

780 H.K.V., Jodhpur—Following is a formula of chalk crayons: Plaster of Paris 3 parts; Precipitated chalk 1 part; China Clay 1 part; Water q.s. Mix all the ingredients and add sufficient quantity of water to make a clay mass which should be poured in mould.

781 K.S.W., Ajmer—You may use molasses. Glucose should be warmed before use. Cream obtained by churning milk should be used in chocolate making. In chocolate clove oil and cinnamon oil should be used. For edible colour enquire of Essence and Bottle Supply Agency, 14, Radha Bazar Street, Calcutta.

782 E.I., Amritsar—For plastic combs enquire of Plastics Moulds Ltd., 38, Netaji Subhas Road, Calcutta; Oriental Import & Export Agency, 52, Shri Krishna Nivas, New Silk Bazar, Kalbadevi Road, Bombay and Basanti Plastic Industries, 22A, Anath Nath Deb Lane, Calcutta 37.

783 R.K.J., Rampur—Process of manufacturing laundry ink will be found in April 1950 issue of Industry.

785 V., Rajkot—For steel chairs enquire of East India Steel Works Ltd., 14, Netaji Subhas Road; Indian Metal & Steel Products Ltd., 20-1, Lall Bazar Street and Steel Products Ltd., 9, Netaji Subhas Road; all of Calcutta. Envelope cutting machines may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta.

787 P.J.K., Baroda—For lottery tickets you may write to Royal Calcutta Turf Club, 13, Russel Street, Calcutta.

788 K.S., Jullunder City—Process of tin printing will appear in Formula section in due course.

789 G.M.B., Imphal—For hop of required brand enquire of Blue Bird Stores, 3, Bertram Street; Mazdas Ltd., 7-1, Lindsay Street; Overseas Distributors, Post Box No. 2557, G.P.O. and G. F. Kellner & Co., Ltd., 32, Chowringhee; all of Calcutta.

790 I.J., Travancore—Reply to your letter has already been sent by post.

794 B.C.D.S., Calcutta—Following is a list of saw mills: A. T. Alihusain & Co., 29, Strand Road; Bahadur Saw Mills, 18, Netaji Subhas Road, and Benarasilall Subhkaran, 10-2, Syed Salley Lane; all of Calcutta.

795 U.N.R., Mangalore—Dairy farming is profitable no doubt. But before starting the farm you should read some books on dairy farm-

[illegible]

[illegible] Co. [illegible] [illegible] Calcutta.

[illegible] T.A.A., Saharanpur—Bottles may be had of Associated Traders, 1[illegible], Lower Chitpur Road; Bimal Bottle Store, 1[illegible]0, Radha Bazar Street; H. D. Dutt & Co., 12, Radha Bazar Lane; C. G. Depot, 18, Parsi Church Street and Radha Bazar Bottle Stores, 15, Radha Bazar Lane; all of Calcutta. For corks and capsules write to Universal Capsule Mfg. Co., Kakinada and Popular Chemical Works, 167, Russa Road, Calcutta. For labels write to Mukherjee & Sons, 3, Ezra Street and R. G. Pal & Co., 110-2, Grey Street; both of Calcutta.

800 S.M.M.S., Madras—Process of manufacturing book binding cloth appeared in May 1950 issue of India.

805 S.I.O.M.K., Karnal—Palmarosa oil is *produced in India by the distillation of the grass* Cymbopogan Martini.

806 S.V., Lucknow—You may use freezing mixture, formula of which follows: Ammonium nitrate 1 oz.; Sodium Carbonate 1 oz.; Water 1 oz.

807 S.H.J., Farrukhabad—No machine is available for extracting juice from mangoes. Mortar and pestle of wood are used for extracting juice or pulp from mangoes. Mango juice is dried in the sun.

808 X.P.C., *Chilaw—Medical* terms of the commodities are not available.

809 B.J.Z., Cambay—For jute bags enquire of Adamjee Hajee Dawood & Co., Ltd., 5, Dalhousie Square; B. M. Kharwar, 161-1, Harrison Road, and Birkmyre Bros., 8, Clive Row; all *of* Calcutta. To communicate with any querist write him with number and initials care of Industry when your letter will be duly redirected.

810 H.S., Jullundur City—All the solid ingredients should be ground and then methylated spirit will be added for the rough mixing.

812 V.P.C., Quilon—For stamping pencil you may try the following formula: Aniline Blue (oil soluble) 5 parts; Oleic Acid 6 parts; Castor Oil 94 parts. Macerate the dye (oil soluble) in oleic acid and then add the oil little by little with constant rubbing. After incorporating the whole of the oil heat the mixture, under constant stirring, to about 167°F.

813 P.S.B., Ootacamund—Process of manufacturing hydro-sulphite of soda will appear in Formula section in due course.

815 J.A.B., Calcutta—V.P.P. cannot be sent to foreign countries. Monetary transactions should be made through exchange banks.

817 M.A.S.C., Karachi—You may consult Vegetable Oil Industry; Cotton Dyeing & Printing; and Manufacture of Rubber Goods; all the books published from this office, price Rs. 3-7 each.

820 G.C., Ahmedabad—We are glad to receive your catalogue.

823 U.S.S.C., Kumbakonam—For electrical goods enquire of Balmer Lawrie & Co., Ltd., 103, Netaji Subhas Road; Bikaner Electric Stores, 32, Ezra Street; F. & C. Osler (India), Ltd., 12, Old Court House Street and Kaycee & Co., Ltd., Bharat Bhawan, Central Avenue; all of Calcutta.

[illegible] B.L.N.R., Chirala—We have no text [illegible] of chemistry. You may enquire of

[illegible] Calcutta [illegible]

834 H.S.W., [illegible]—[illegible] manufacturing soap with soap [illegible] process as in [illegible] vegetable oil.

835 T.B., Secunderabad—All the ingredients may be had of Banshidhar Dutt, 1[illegible]6, [illegible]patty Street, Calcutta.

836 R.S.V., Banaras—Plastic moulding powder may be had of Imperial Chemical Industries (India), Ltd., 18, Strand Road, Calcutta.

837 P.P.W., Poona City—Process of manufacturing D.D.T. powder and solution will appear in Formula section in due course.

838 R.V.S., Bulandshahr—For starting a printing press you require many things [illegible] printing machines and types are required. For printing machines enquire of Indo-Swiss Trading Co., Ltd., P-36, Mission Row Extension and John Dickinson & Co., 8, Clive Row; both of Calcutta. Types may be had of Eastern Type Foundry, 18, Brindaban Basak Street and [illegible] Type Foundry, 1, Niroda Behari Mullick [illegible], both of Calcutta.

839 B.M., Midnapore—We have no book dealing with detailed process of photo enamelling and photo on enamels and porcelain. For ingredients you may enquire of Hamilton & Co., Ltd., 8, Old Court House Street, Calcutta.

840 S.V., Lucknow—Following is a formula of waterproof ink for marking labels. Dissolve 6 lbs. of rosin and 40 oz. of shellac in smallest quantity of methylated spirit. Keep this in a mortar and mix 5 lbs. of lampblack thoroughly with them. Then add some more spirit and bottle. In all about 10 pints of methylated spirit will be required for the preparation of the ink.

841 M.A.M., Galle—For a technician you should advertise in newspapers. We are not in touch with any technician.

842 N.S.T., Shillong—Caustic soda and other soap materials may be had of Calcutta Mineral Supply Co., Ltd., 31, Jackson Lane, Calcutta.

843 R.S., Delhi—Formula of artificial [illegible] is not available.

844 K.G.C.I., Vilampatti—Grind broken glasses to powder and melt in a muffle furnace.

845 S.L., Jaipur—Process of manufacturing saccharine appeared in August 1949 issue of Industry. Process of manufacturing menthol appeared in December 1949 issue of Industry.

846 G.S.S., Jullundur City—You may use printing ink for stamping varnished wood.

847 N.P.R., Travancore—You may consult Manufacture of Rubber Goods published from this office, price Rs. 2-7 including postage. Rubber chemicals may be had of Najmuddin Bros., Akbar Chambers, Mohmedali Road, Bombay 3. You may prepare moulds of wood. [illegible]

[illegible] of [illegible] & Co., [illegible], [illegible] Road, Calcutta.

848 A.P., Madras—Process of refining all kinds of vegetable oils will be found in Vegetable Oil Industry published from this office, price Rs. 3-7 including postage. You may mix white oil in vegetable oils. Perfumes may be had of Paradise Perfumery House, 7, Colootola Street, Calcutta; Sikri & Co., 55, Canning St., Calcutta and F. N. Sarcar, 37, Canning Street, Calcutta.

849 M.D.L.C., Madhubani—For rope making machine enquire of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta.

850 B.M.J., Bombay—We cannot advise you regarding talisman. You better write direct to the astrologer.

851 I.U.I., Bombay—Following is a formula of chalk crayons: Plaster of Paris 2 parts; Precipitated chalk 1 part; China Clay 1 part; Water q.s. Mix the powder and add sufficient water to make a paste which should be poured in gun metal mould.

852 P.H.L., Kanpur—For saccharine enquire of B. K. Paul & Co., Ltd., 1 & 3, Bonfield Lane Calcutta. Tinned milk will also be supplied by the above firm.

853 B.V.K., Trinellage—Collapsible tubes may be had of Metal Box Co. of India Ltd., B-2, Hide Road, Calcutta. For cementing film you should use celluloid cement. Following is a formula of celluloid cement: Make a mixture of 3 parts of alcohol and 4 parts of ether. Keep this mixture in a well-corked bottle and when it is needed for use the film is painted over with this mixture until the surfaces soften; then press together and bind and allow to dry for at least 24 hours.

854 K.S., Aligarh—Bones to be used as feed for cattle should be fresh from which flesh and excrements should be removed by boiling in water. Then dry and grind in grinding machine. For bone crushing machine enquire of Marshall Sons & Co., Ltd., 99, Netaji Subhas Road, Calcutta.

855 A.S., Saharanpur—For cellophane paper enquire of Bholanath Paper House Ltd., Kusum Smriti, 21, Beadon Street; Mukherjee Dutt & Co., 31, Jackson Lane and Raghunath Dutt & Sons, Ltd., 33-2, Beadon Street; all of Calcutta.

856 T.S.R., Ellore—China clay is a natural product. Other two ingredients cannot be manufactured on small scale For chloride of barium you may enquire of Calcutta Chemical Co., Ltd., 10, Bonfield Lane Calcutta.

857 M.Y., Calcutta—You better consult an expert in plastic industry.

858 M.L., Allahabad—For plastic sheets and [illegible] enquire of Plastics Moulders Ltd., 38, [illegible] Road, [illegible] Trading Co. of India, [illegible] Road, Bombay 1 and Popular [illegible] House, Opp. Colaba-Tram Terminus, Bombay 1.

880 A.N., Jodhpur—It is not possible to dissolve and again solidify plastic.

881 P.R.K., Bombay—In place of alcohol you may use ether.

882 P. A. A. A., Tirupattwe—For selling beedies and snuff you should advertise in local papers.

884 P.C.G., Berhampur—Formula of ink powder appeared in April 1950 issue of Industry.

886 P.L.V., Orai—For nail making machine enquire of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension Calcutta. For ice making plants enquire of Sulzer Bros., 11, Netaji Subhas Road, Calcutta.

887 G.C.C.S., Rajahmundry—Electric goods may be had of Hercules Electric Trading Co., Vithal Sayana Bldg., 2, Lohar Chawl, Bombay; Indian Electric Stores, 123, Lohar Chawl, Bombay; Narendra Electric Store, 158, Lohar Chawl, Bombay; Balmer Lawrie & Co., Ltd., 103, Netaji Subhas Road, Calcutta and Kaycee & Co., Ltd., Bharat Bhawan, Central Avenue, Calcutta.

890 K.K.C., Ludhiana—For transfer write to Signograph Co., Barnagore, Calcutta 37.

891 B.A.G., Baroda—Process of manufacturing kimam and zarda, appeared in April 1950 issue of Industry.

892 B.B.O, Sasaram—For all-India directories write to Thacker Spink & Co. (1933), Ltd., 3, Esplanade East, Calcutta and Industry Publishers Ltd., 22, R. G. Kar Road, Calcutta.

893 A.S., Ahmedgarh—Radio coils may be manufactured by hand and also by machine. For machines enquire of C. C. Saha Ltd., 170, Dharamtala Street, Calcutta and Electro Radios Ltd., 10, Chowringhee Road, Calcutta.

894 R.M., Barnagar—You may learn tailoring in College of Wireless and Commerce, 212, Bow Bazar Street, Calcutta.

895 G.S.T., Patna—With small capital you may start ink manufacture. As regards shop you may start a shop dealing in food grain.

896 K.V.N., Madras—Take hard paraffin 3 parts, sawdust 1 part. Melt the paraffin and add sawdust and mix thoroughly and pour to tray. When cold cut into blocks.

897 T.A., Jamgaon—Please write in English.

898 D.F.W., Bombay—Following is a formula of shoe sole paint: Montanwax 25 parts; beeswax 25 parts; paraffin 25 parts; linseed oil 2 parts; iron oxide red 22 parts; brown dye, oil-soluble 1 part. Following is a formula of heel ball · Carnauba wax 40 parts; ozokerite 3 parts; paraffin wax 58 parts; rosin 2 parts; oil soluble dye 7 parts. Melt over slow-fire and pour in metal moulds.

REVIEW OF BOOKS

AN ESSAY ON NATIONAL INCOME AND EXPENDITURE IN INDIA by R. Natarajan, M.A., D.Litt. Published by the Economic Adviser to the Government of Madras. Pages, 182, price Rs. 3/-.

This book is believed to be the first serious attempt of its kind to assess the national income and expenditure of the Indian Union. Being himself a high Government official of Madras the author could have a ready access to information and statistics with which the work is packed so commendably. We are not sure if the author can claim cent per cent accuracy with regard to the figures he has given. The following words quoted by the author are significant :—"Information should not be withheld merely because it is approximate. If it is useful and believed to be reasonably correct, it should be published if there is no chance of better data becoming available in the near future." (Canadian Journal of Economics and Political Science, February, 1949).

In the course of his study of the problem of national income and expenditure the author reaches the following main conclusions :—

(1) "Although national income of Indian Union has mounted from Rs. 1482.4 crores in 1938-39 to Rs. 5657.5 crores in 1949-50 or 3.82 fold, real national income has risen but slightly to Rs. 1504 crores or by 1.45 per cent.

(2) "The average per capita income has risen from Rs. 67-8-10 to Rs. 226-10-0 or 3.36 fold but the per capita real income has fallen from Rs. 67-8-10 to Rs. 60-12-0 or by 10.1 per cent.

(3) "Viewed from the standpoint of occupational distribution, the primary services have gained a larger share in the national cake during the last ten years while the secondary and tertiary services have been losers to a certain extent, the latter even more than the former. The result has been a tendency towards narrowing down the gap in per capita incomes between the primary and the other two series—although the disparity is still to the disadvantage of the primary services."

According to the author, "the burden of provincial revenues to-day is about a third lighter than what it was a decade ago." The burden of taxation at the centre has risen by 31.63 per cent. The percentage of tax revenue to national money income has risen from 7.43 in 1938-39 to 8.17 in 1949-50. The receipts from direct taxes have shrunk from 43.65 per cent in 1938-39 to 41.37 per cent of the total tax revenue in 1948-49; the receipts from indirect taxes have increased from 56.35 per cent. to 58.63 per cent.

The book is rounded off with a number of appendices giving statistical information about revenue including direct and indirect taxes, national income, and provincial and central [illegible]

REPORT BY THE RAILWAY BOARD ON INDIAN RAILWAYS FOR 1948-49, VOLUME NO. 1. Published by The Manager of Publications, Government of India, Delhi, Pages 138, price, not mentioned.

The Report under notice deals with the various aspects of railway working, such as general administration, financial [illegible] improvements in and additions to rolling stock, commercial and operating methods, recruitment, training and welfare of staffs, and facilities provided for the convenience of the travelling public.

The Report claims that "the principal features of 1948-49 from the point of view of Indian Railways were the maintenance of high levels of traffic, upward trends in earnings and the reduction of transport shortages."

As compared with 1947-48, there was during 1948-49, a general increase in the traffic handled, both passenger and goods. The gross traffic receipts amounted to Rs. [illegible] crores. After meeting all charges, including depreciation and interest charges, the surplus for the period boiled down to Rs. 19.93 crores. In 1938-39 the third class accounted for 97 per cent of the total number of passengers and [illegible] per cent of the total passenger miles. The corresponding percentage, which stood at [illegible] per cent and 92 per cent in 1947-48, rose to [illegible] per cent and 93.5 per cent respectively of the total number of passengers and passenger miles in 1948-49. The volume of goods traffic during 1948-49, excluding Eastern Punjab and Assam Railways, showed an increase of 9.1 per cent over the preceding year. The train mileage run during 1948-49 records an increase of [illegible] million or 1.69 per cent over the previous year. The Report says that punctuality of passenger trains has improved. As regards goods services, it claims greater efficiency in performance.

Details are given of new constructions and works already completed as well as the projected ones; about railway collieries, rolling stock and materials, amenities for staff and passengers, and about accidents which have become a rather frequent phenomenon on the Indian railways. The most important single achievement of the Indian railways last year is the setting up the Locomotive Works at Chittaranjan near Asansol, which went into production on January 26 this year. The output from railway collieries in 1948-49 was 11.52 per cent less than in the previous year. The quantity of coal carried by the E. I. and B. N. Rlys. during 1948-49 was 24.45 million tons against 23.35 million tons in the previous [illegible]

[illegible] of five major accidents [illegible] other accidents. The total number of [illegible] killed was 4,660. The total approximate [illegible] of damage to rolling stock and permanent way involved in the five major accidents [illegible] estimated at Rs. 2,94,100.

THE CONSTITUTION OF INDIA, By Amar [illegible], Published by Bookland Ltd., 1, Sankar [illegible] Lane, Calcutta 6. Pages, 211, price [illegible].

Though in the main the work is a review of India's new Constitution, the initial chapters deal with the constitutional and administrative [illegible] made from time to time during the British regime. These initial chapters contain materials which give some idea regarding India's political set-up since the end of World War I right up to August 15, 1947 when the transfer of power took place.

The author's estimate of the new Constitution is not laudatory. On the contrary he is quite alive to two of its defects, namely, its excessive centralisation of power and the emergency powers vested in the President. Perhaps, the need for a strong centre is felt in view of the fact that India is a very vast country inhabited by many different races who speak different languages and possess different cultural and social traditions. It is, however, doubtful if centrism is the best antidote to the risk of disintegration developing among our peoples. Already, as we can well see, the imposition of Hindi as the only State language of the Union has not been received well in all quarters and been described as language imperialism.

Commenting on the bright features of the Constitution the author draws attention to the following: "The Constitution abolishes untouchability. It abolishes communal electorates. It abolishes and expunges from the face of India the vestiges of mediaevalism represented by the autocratic rule of Princes in five hundred and odd Indian States. It introduces universal adult franchise thereby giving the right to vote to eighteen crores of people—the largest body of voters in the world. It makes compensation for State acquisition of property non-justiciable thus clearing one of the greatest difficulties in the way of nationalisation of industries and the abolition of zamindari. It gives the courts the power of enforcing the fundamental rights and also of declaring laws [illegible] those rights to be unconstitutional [illegible]".

On the whole the treatment followed in the [illegible] notice is objective rather than [illegible]. In fact at places it seems difficult to [illegible] the feeling that the work is more or less [illegible] of the Constitution [illegible] likely to prove useful to [illegible] up for the degree examinations of the [illegible] Universities.

NOTICES & REVIEWS

([illegible] sending samples of their products for notice and review may please note that no notice is published of medical preparations and allied substances in this section.)

BENGALI PANJI (IN BENGALI)

We are glad to acknowledge 5 copies of Bengali Panji (Pocket Book for B.S. 1357) published by Calcutta Chemical Co., Ltd., 35, Panditia Road, Calcutta 29. This is really a new type of Bengali diary containing many useful information about Bengal and Bengalee people besides numerous thought-provoking quotations from eminent Bengalee Poets and Writers. We congratulate the Calcutta Chemical Co., Ltd., for compiling and publishing such a usefull diary at this abnormal time.

A BOOK ON SOAP MAKING (IN HINDI)

We have received a copy of book entitled "Sabun Vigyan" (Soap Technology) by Sri Sayam Narain Kapur. The book deals in detail all the processes of soap making in simple Hindi language. It also contains many plates and illustrations. It is published by Oil Technological Association of India, Kanpur. Its price is Rs. 6.

ADVERTISING SIGNS

We have the pleasure to receive a specimen of Everbright Sign with our name thereon from Jagdish Prashad Shah, 10, Murlidhar Sen Lane, Calcutta 7. This new advertisement sign is unfadable, remains bright by ordinary light and glows with sunlight.

MARKING INK

We have received from Sellkers Laboratory, 35, Paikpara Road, Belgachia, Calcutta 37 one phial of black marking ink. We have used it and found it quite satisfactory.

TRADE ENQUIRIES

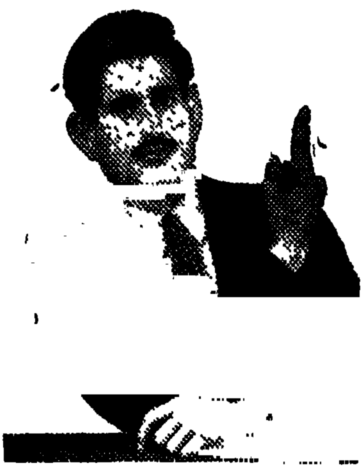
(To communicate with any party write to him direct with name and address given below mentioning Industry).

614 Mohan Brothers, Jagraon, Ludhiana—Want to be put in touch with the manufacturers of "Dipak Buttons".

867 R.D., Gayal Betul, C.P.—Wants to be put in touch with the importers of tamarind and tamarind seeds.

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Published in the first week of the month by
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EDITORIAL CONTENTS FOR JULY, 1950

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All enquiries regarding industrial or business information should be addressed to the Editor. Contributions and articles for review and notice should also be sent to him.

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Editorial Department — 11 A.M. to 4 P.M. on weekdays and 11 A.M. to 2 P.M. on Saturdays.

Subscription and Advertisement Department 10 A.M. to 5 P.M. on weekdays and 10 A.M. to 2 P.M. on Saturdays.

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ADVERTISEMENTS under this head of small announcements cost 4 As. per word, minimum Rs. 3 payable by Postage Stamp or M.O. with order. No vouchers given.
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Directory containing about 6000 addresses of Provision Dealers, Oilmanstores & General Merchants from nearly 600 towns for Rs. 5/- only. Bharat Directories Corporation, 4-Daryaganj, Post Box 1354, Delhi. 323 BK

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Bansidhur Dutt, 126, Khengrapatty Street, Calcutta Botanical Crude Drugs, Spices, Gums, Waxes, Mercury, Starch, Poisons, Heavy Chemicals. 624 CD

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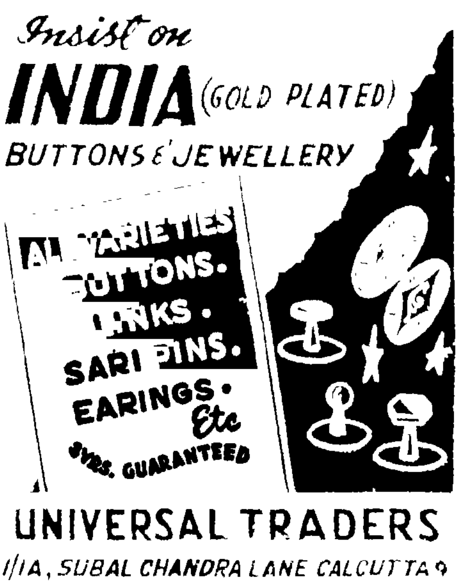
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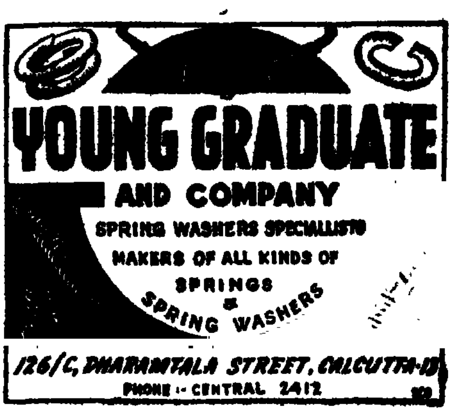
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Industry

EDITOR:

K. N. BANERJEE.

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THE ECONOMIC OUTLOOK

THIS Special Annual Number of Industry is being brought out in response to our readers' request and at a time when confronted with an ever deteriorating economic situation the common man everywhere in this country is feeling bewildered.

More than two years have elapsed since India became independent. But there is nothing inspiring in our newly acquired political status, for so far we have failed to give any real meaning to it by co-ordinating the economic with the political aspects of freedom. To put it in more concrete terms, we have not made much headway towards the realisation of our oft-repeated aim of producing more wealth for the purpose of raising our people's standard of living.

Look wherever you will, you cannot find anything else than appalling poverty and an all-round scarcity of the primary needs of life. In the prevailing atmosphere of insufficient food, clothing and shelter the glitter and pomp visible in certain quarters are but an exception, a sort of comic interlude in an otherwise tragic scheme of things.

The utility of this Annual lies in the fact that its contents will help our readers to ascertain aright the exact nature of the vast and varied problems which face the country to-day and also to get some idea as to how these problems can be liquidated. We do not claim to have uttered the last word, but we do believe that this Annual will go a long way towards awakening our countrymen to the realities of the situation.

And these realities are no doubt very grave. A sum-up of the prevailing economic situation in India was very ably made by Mr. C. H. Bhabha, our former Commerce Minister in a recent speech to Bombay's Commerce graduates. According to him, in spite of increased expenditure on agriculture and industry, production has decreased. Giving figures Mr. Bhabha said that while the total production of food in 1944-45 was about 52m tons, the yield in 1948-49 was only 43m tons. India's dependence on food imports has gone up from 1.8m tons in 1944-45 to 4m tons in 1948-49.

In the industrial field the picture is none too bright. The major Indian industries have shown a decline in production. Production of

finished steel, Mr. Bhabha said, fell from 934,000 tons in 1944 to 854,000 tons in 1948, and cotton yarn from 16.43m lbs. in 1944 to 13.59m lbs. in 1949.

We refer to the figures quoted by Mr. Bhabha only to explain the exact nature of the crisis which confronts our economy to-day : it is a crisis of underproduction unlike the 'boom' crisis of the thirties which was a crisis of over-production.

Despite all odds, however, efforts should be made to key up production of the national wealth, both agricultural and industrial. There is no point in leaving things alone : that way lies chaos and the danger of utter ruination of the democratic system. The need to-day is combined effort by Government and the people to render impossible the drift to chaos and disorder by increased production of food, raw materials as well as finished products. The task is no doubt Herculean, but it is worth attempting it by all means.

Complaints have been made from time to time that the present crisis in production is due to "the uncertain economic policy of the Government—the crushing burden of taxation, the constant fear of nationalization and the appeasement of Capital and Labour." Spokesmen of Capital have been alleging further that the Government are only "preaching economy and not practising it themselves." Expenditure in Government departments is said to have gone up fourfold, but efficiency has declined. Government interference is abhorred.

We do not think these allegations are baseless, but that is no reason why Capital should sit up tight and withdraw its co-operation from the Government in the most urgent task of enhancing the output of the national dividend. A modern Government can hardly afford to allow uncontrolled private enterprise and it is not understandable how our industrialists could still talk of the crushing burden of taxation even after the enormous tax reliefs provided for in this year's Budget.

Nationalization is, of course, a controversial topic. But nobody should dispute the necessity of nationalising the key and basic enterprises, railway transport, posts and telegraph, and the defence industries. Most economists agree that India requires at the present stage a mixed system of economy with three sectors : (1) A sector of private enterprises ; (2) A sector consisting of State-owned new enterprises ; and (3) A sector of State industries to be carved out of the existing private concerns. In this connexion the Government is following an evasive policy. A categorical statement from the Government is needed to restore confidence of those who are afraid they may have to wake up one dull morning to find that the private enterprises in their ownership are to be taken over by the Government.

A serious defect of our economy is that its growth so far has been an unbalanced one. We have to restore balance between agriculture and industry on the one hand and between big and small industries on the

other. What is wrong with our thinkers is that some of them openly seek to put the hands of the clock back by resorting to villagism, while others think so big as to ignore the basic realities of Indian economic life. We should see and see it clearly that in order to work out our economic salvation we shall have to plan a co-ordinated harmonious development of our two economies, urban and rural.

To the task of economic development we shall have to harness the combined efforts of Labour and Capital and the Government will have to open out facilities for training, research and credit and foster co-operative movement as well as procure help from foreign countries in machinery, technical "know-how" and also money. But foreign help we need only as a sort of catalytic agent meant to whip up activity here. We must not allow ourselves to be enslaved by it and even if we do not get it we must not fail to make a beginning in our humble way and depending on our own limited resources. Foreign capital both as loan and in the shape of investment by foreign private enterprise in undertakings directly on our soil—has a great role to play in helping Indian economy on to its feet. But to any such aid from abroad no political string should be allowed to be attached nor should we be ready to be so liberal to foreign investors as to prejudice our own national interests.

MUNSHI'S FOOD PLAN

In recent years there has been much too much talk about planning unaccompanied by any achievement worth the name. As a result very few find it possible to pay any serious attention to the trite pronouncements of officials on the need to rehabilitate the country's economy. Apart from being superficial, most of these pronouncements seldom deal with the concrete steps that should be taken to realise the aims which are so eloquently expatiated upon. The eight-point scheme of our new Food Minister, Mr. K. M. Munshi does not suffer from such defects and yet it is doubtful if it can succeed in enthusing the public sufficiently, for the public could hardly be made to change their opinion overnight about a Government whose debits far exceed its credits in the matter of solving the people's elementary problems of food, clothing and shelter.

Judged in and for itself and divorced from the sickening context of so many big electoral promises absolutely repudiated in practice, however, the Munshi Plan for self-sufficiency in food, cotton and jute may deserve more attention than it is likely to get in the prevailing atmosphere of skepticism not altogether unreasonable nor unjustified. Nevertheless the Munshi Plan has certain commendable features in as much as they are practical and well reflect the new Food Minister's intention to get things done.

Mr. Munshi's eight-point plan consists of (1) establishment of inter-departmental emergency committees at the Centre and in the States to decide on matters relating to increasing production of food, cotton, and jute; (2) appointment of committees to assist collectors for creating confidence among local farmers; (3) harnessing of village representatives for dealing with questions, such as fallow land cultivation, tank repairs, preparation of composts, etc.; (4) review of the existing facilities; (5) boring wells for irrigation; (6) co-ordinated plan for a three-fold self-sufficiency—in food, jute and cotton; (7) afforestation to be undertaken; and (8) growing of vegetables in urban areas.

Like most other Ministers and spokesmen of the Food Department Mr. Munshi has reiterated afresh his Government's determination to stop all imports of food grains by the end of next year. Repetition of this thrice-told tale is not justifiable except as a kind of encouragement to the people to grow more rice, wheat and other grains so as to make it possible for us to end our dependence on imports of these food articles. Whether, of course the fixation of a dead line in the matter of stopping foodgrain imports from abroad is wise in the prevailing situation on the production front, is undoubtedly debatable. Rightly or wrongly the public has carried away the impression that the Government thinks all its duty ends by simply asking the farmers to grow more food. All sorts of obstacles hamper the proper execution of this onerous task. To mention only a few of these, agriculture in India is a victim to unscientific methods of cultivation, rural poverty and a defective and obsolete land system and succession law which render agriculture an extremely hazardous and uneconomic occupation. Our present rulers seek to retain the old dilapidated structure intact and yet attain self-sufficiency in food by a certain date. For our part, we feel we should not delude our readers into believing that this laudable aim can be realized at any foreseeable future date.

To return to the Munshi Plan, it is now common knowledge that the failure of the Grow More Food Campaign was due to lack of co-ordination of efforts of the various Government Departments and between these and the farmer who actually tills the soil and produces the food. The new Food Minister's scheme seeks to remove these defects.

Mr. Munshi's emphasis on irrigation and on the need to end the age-old dependence of our cultivators on the vagaries of weather, is surprisingly enough no prelude to the usual official panegyrisation of our multi-purpose river projects most of which will not be completed for at least a decade to come. Mr. Munshi has suggested a practical remedy, namely, sinking of tube-wells which, he said, should be left to private firms or co-operative societies.

INDUSTRIAL RAW MATERIALS

India's deficiency in money crops like jute and cotton cannot cause any the less anxiety than her deficiency in food. That shortage of money crops can seriously hamper industrial production, has been amply demonstrated in recent months when due to exchange difficulties India was forced to stop imports of jute and cotton from Pakistan. Nevertheless the cloud is not without a silver lining; under pressure of circumstances efforts are now being made within the country to produce its own requirements of industrial raw materials, such as jute and cotton. But what is important in this connexion is, that even though we need money crops badly enough to keep our industries going, we should on no account divert land from food to cotton and jute cultivation. Since, however, all three are required in abundant quantities to build up a prosperous balanced economy, the need is to put out a co-ordinated plan for achieving three-fold sufficiency, such as the Munshi Scheme streesses.

Afforestation is now become a first-rate necessity. The country's forests are growing sparse and planting of trees is being urged rightly; as forests are a source of fuel on the availability of which will depend our capacity to utilize cowdung solely as manure. Also, forests arrest the drifting cloud and play an important role in checking reduced rainfall.

RE-GROUPING OF RAILWAYS

The Government of India have announced a tentative scheme for the re-grouping of the railways on a regional basis. Proposals for rationalization and re-grouping of the existing system were made from time to time in the past, but no action could be taken in this regard as all major railways were not under State management. But to-day the obstacle has been removed with the bringing of railways in princely India under a joint administration.

The advantages of grouping are: larger administrative pools which will mean economy in staffs at headquarters; centralised control which may lead to greater efficiency; grouping may also mean greater co-operation between regional authorities of railways and State Governments. But grouping has its disadvantages also. The Wedgewood Committee pointed out that there was the risk of overcentralisation and too large administrative units. The Kunzru Committee opined that amalgamation or transfer of parts of one system to another would result in temporary loss of efficiency The Railway Board, therefore, has decided to proceed slowly and cautiously in the matter of regrouping of the railways on a regional basis.

FINANCE MINISTRY

The retiring Finance Minister, Dr. Matthai's disclosure as to how the recommendations of the Standing Finance Committee had been flouted, has created a great deal of anxiety among all those interested in this country's economic and financial stability. It is now considered likely that steps will be taken to end this unfortunate state of affairs at the topmost level in India's administration. The allegations made by Dr. Matthai are serious and call for a fresh determination of the status of the Finance Committee and of the Finance Ministry's relation with the rest of the Cabinet. Even though the Finance Minister has to act within the framework of joint cabinet responsibility, he has a special responsibility towards the Government and the people in as much as he is concerned with the procurement and expenditure of funds. The flouting of the Standing Finance Committee's suggestions, such as Dr. Matthai has alleged, with regard to the Dublin embassy is considerably unfortunate as well as puzzling as it goes against the Government's decision to cut down expenses whenever possible.

MAHATAB'S APPEAL

Immediately on assumption of his new post as India's Minister of Supply and Industries Mr. H. K. Mahatab made an appeal to the industrialists to co-operate with the Government and put an end to "mutual accusations and recriminations." What is most interesting about this appeal is that it cannot but be construed as a tacit admission of the truth behind the allegation that Capital is on strike here, not Labour. If, however, that be a fact and our industrialists have failed to be sufficiently patriotic, the Government too must share part of the blame. One has the right to ask why the Government failed to get co-operation from industrialists. Has the sad phenomenon got anything to do with the Government's industrial policy which has remained amorphous for the most part? And if our capitalists have betrayed a thorough lack of social sense combined with recalcitrance, why could not the Government subdue them and force them to take the proper path of serving national welfare through increased production?

Mr. Mahatab was heard to talk of the interests of the common man in his first public statement as India's Supply Minister. Labour and Capital are not the only factors in a nation's economic life. The man who is purchasing the products is also important.

There is food for thought in Mr. Mahatab's suggestion that industrialists need not look for fresh capital in the share market, but from the farmers. It is believed that in recent years certain section of farmers have been able to acquire a surplus purchasing power. But they usually hoard their savings and do not invest them in any kind of business enterprise nor deposit their money in banks. Of course in rural areas banking facilities are very rare. What is now needed is that the farmers' savings should be ploughed back into the work of economic development. But the entire burden of making peasants investment-conscious should be borne by the Government.

—The Counterblast to the Hydrogen Bomb

By Sri J. C. KUMARAPPA

THE peace loving populations of the world are aghast at the magnitude of destruction contemplated by the Hydrogen bomb. How many of us realise that the remedy lies in our own hands—cottage industries make for peace just as centralised industries lead to violence. Hence we must explore ways to peace through cottage industries.

Animals live and die on the earth. They are of the earth earthy: Man rises higher than this only when he begins to see that he is a social animal. Even the bee works for the whole colony. At this stage there should be a spiritual sublimation of our individual instincts—the sublimation of fatherhood, motherhood, brotherhood. To feel that our standard of living will come down when we relieve the sufferings of others, is to bring ourselves down to the animal level.

Even the animal is capable of being classified into various groups according to the purpose of its work. Taking us at the animal level we work to satisfy our hunger. Animals go about to satisfy their main primary need by, say, five different approaches. The first one is the simplest. The tiger goes and takes other creatures that live in the jungle. This is the parasitic stage. Then there comes the predatory stage—the monkey takes the apple from the tree. It does not consider if it has done any work for it. Here, the violence of the tiger is lessened. But in both there is consumption without contribution. Thirdly, the bird that builds a nest, in economic terms, is both a producer and a consumer, and here is a further decrease of violence. This might be called the "enterprising stage". The fourth stage is noticed in the life of the honey bees. They don't produce for their own benefit, they produce for the benefit of the whole group. This is the gregarious stage. Then we come to the final stage, the service stage, as when the mother bird picks up food and takes it to the baby birds in the nest and gives without expecting any return.

We all function in these five stages at different times. The moment we begin to develop the people towards the service stage, we are reducing the need for and chances of war. The nearer we get to the service stage the less and less violence we shall find in society.

As you begin to balance rights and duties civilization comes in. With the "tiger" and the "monkey" there are only rights and no duties, but as man grows higher and higher duty begins to enlarge. Unfortunately labour unions, etc. are all right centred and, therefore, their efforts lead to general conflict. We have got to come to the duty centred economy.

Our ideal must be to reach that stage where there would be no wars at all. To this end we must educate the people into the service stage.

War has to be abolished by taking away the motives for war. So long as there are "tigers" in society there will be wars. We may be intensifying wars if we don't approach them from the right end, and the right end is your life and mine. It is in our everyday life, in our private life, that our mission has to begin.

People in the city who buy milk are stealing it out of the mouths of the children

if the milk is not out of a surplus. When we get raw material from other countries, how many of us know that they are not being stolen from hungry mouths? When we get food from other countries, how do we know that there are not head bodies behind it? Unless there is a surplus one has no right to buy from others. Every country has to be self-sufficient in food, clothing and other primary needs. Unless we are self-sufficient we cannot maintain our independence. We are not against international trade, but the natural foods and things of that kind which we need must be grown or produced in our home-land, otherwise it is not possible to remain non-violent.

When a new mill is brought into existence the raw materials for it are got from the land which is growing food today. This is a further pressure on the food-growing land. Tobacco is being grown in rice lands. The Government had opened a seed depot for the Imperial Tobacco Co. of London. Under such conditions when Indian trade has to import food we are coming down to the "tiger" stage and this will lead to violence. When India gets her claws and fangs we shall all have to sit up and take notice. It will be a menace to world peace. There are four hundred millions to make gun fodder!

At a certain village an old woman told me, "When I was a little girl all this land was for rice growing. But we were given good prices for the land and so we sold it. Now this land grows coconut trees and we are too poor to buy the coconuts". All these lands had belonged to the villagers who sold them for good prices and now coconut trees were grown. Now they had neither rice nor coconuts. The coconuts go to the mills where they are converted into coconut oil which is used in the manufacture of soap and similar articles. The land has been converted into a soap-maker's land and the people's food comes from Brazil! To make certain that they get it they will need atom bombs. We cannot have foreign food and at the same time avoid wars. Every country must produce its own food or ultimately you must hold in bondage those who produce it for you to see that they do send it to you. International trade can be there, but not on the food line or the clothing line or prime necessities line, but only in surpluses and luxuries.

There is a definite difference between the wars of the ancient time and the wars of the present day. In fact they are two different things and it is wrong to call them both "wars". We must differentiate them by some other term.

In olden times wars arose out of animal instinct for greed. In the 20th century war is a very different thing, it is not just brigandage. Churchill or Roosevelt or Hitler were not brigands. They were the victims of what is called democracy. The violence that is within the people expressed itself through them. By an educational process people are brought to sing in unison hymns of hatred, hymns of denunciation against other nations. War propaganda is a poisonous injection into the body politic. The warring of nation against nation is altogether a new thing. By a process of education we can bring the nations together. We should take up that constructive part of the work of educating the public and of bringing them to a service economy. We have got to isolate the cause and deal with it. You cannot have peace without attacking the cause of wars.

We have seen that the cause of wars is greed of man for material things irrespective of consequences. That is why centralized methods of production have been introduced, which ultimately lead to the control of other people's lives.

Modern industrial magnates control the lives of so many thousands of people and then we call ourselves democracies! If you are working up to a democracy in politics you must have a democracy in economics. There is no meaning at all in such terms as Communist, Fascists, etc. The distinction should rather be between centralization and decentralization. The test of a country being democratic or not is when it is in trouble. In the times of stress and strain, what were the nations of Europe? Dictatorships. You must ultimately decentralize control if you are to abolish war. Then a man's conscience will be the sole dictator as to whether a thing is right or wrong. Ideally this is something we may never attain, but we must move towards the ideal. We must have certain centralized productions—communications and the like—but these key industries must be sterilised of the profit motive, they should be like public utilities owned or controlled by the State.

In a village in South India I found the owner of six looms worked by power twiddling his thumbs. I asked him why the mill was not working. He could not get enough raw material. He was also selling cloth 400 miles away and there was a bottleneck in the transport. He wanted to know how to ensure his supply of raw material and his market. I advised him to go to Madras where he would find a whole lot of brigands. He should get 200 of these men and let each be armed with a dagger and take them to the yarn mills. The moment the people at the mills saw the daggers they would run away leaving all the yarn he wanted! Then he could go to Delhi and those who deal with transport also would not like the look of a rifle or a dagger. They would give him anything he wanted! Such is the basis of all Imperialism. When you need to control your raw materials and control your markets, you cannot do that without bombs. It is no good denouncing the bombs. You cannot have your cake and eat it too. We must begin with ourselves. Indeed Gandhiji gave us a programme of all kinds of cottage industries starting from this end as he realised the need for decentralization in the production of consumption goods. This leads us to regional self-sufficiency ultimately.

Gandhiji was not interested in the economic side of things for its own sake. He was interested in only one thing, that is truth; and all things that lead to untruth, all things that lead to violence he wanted to remove from society. Hence this programme of work.

We have got to go to nature to obtain raw materials for all our economic needs. There are two kinds of sources. One is a reservoir, such as minerals, iron, copper and all sorts of such things which in nature are in a reservoir form to some extent. Things like cotton, wool, wood, exist not in reservoir form, but as a current, like a river running all the time. These latter do not get exhausted as we go on using them, as they are in current form. Current economy is non-violent, the reservoir form is violent as it gets exhausted.

For instance a person dies and leaves to two sons Rs. 10,000 each. One goes to Bombay and spends his capital in luxurious living. The other sets up a little grocery shop, say in a village and gets from it two or three hundred rupees income a year and lives on that income. One is living on his capital, the other on his income. What is the psychological effect of these two methods of living? The village man develops into a man who is provident: while the man who spends his capital, after it has gone, looks round to see who else has money from whom it can be obtained easily by gambling, forgery, etc.

or becomes a brigand to get money quickly. When you live on capital or live on a reservoir economy you develop different mentalities from the one that current economy develops. Imperialism has arisen out of our getting away from current economy into the reservoir economy.

One hundred years ago there were no global wars. Why? Then England was on a horse economy. The horse was the motive force. The horse belongs to a current economy. In India the cow is the motive force—the sacred animal of the country. What is called the industrial revolution in England was the ultimate results of the discovery of steam power. The horse economy gave way to the coal economy, a reservoir economy, which develops violence, and then came along another reservoir motive force, namely petrol. Petrol has got into short supply, so that the Middle West is being looked upon with covetous eyes. Therefore there are these global wars, which really began with the industrial revolution. America, with her tremendous supply of petrol which is now going down, is beginning to turn towards the East. Violence is increasing as you go on shifting your methods of production from nature in the current form to nature in the reservoir form. Thus houses that are built of bricks and wood, can largely be said to belong to current economy, but when you come to concrete and steel you are coming into the reservoir economy. To what extent can we go on wastefully exhausting supplies as we have been doing and called it a high standard of living—living with no security? Wherever there is an over-emphasis on the reservoir economy, we should be on our guard as it will increase violence in society and culminate in wars.

It should be our intention to live as far as possible on current products—to use the things we produce. We, in India, believe in using our own home-spun yarn. This is what Gandhiji wants us to do. Abolishing war has to begin at our breakfast table. Let us begin with ourselves and start with our daily lives and the accumulated violence that comes out in the form of war will take care of itself.

There is something more fundamental than taking away the pistol or disarming nations. Nations will disarm of their own accord provided they can be moved up into the mother-service economy. The national governments will then take their rightful places. They need not formulate Leagues of Nations or U.N.O.'s. The real thing is to isolate the factor that produces violence, which our method of living to-day and our present type of economic organization. We shall have to shift from a right-centred economy to a duty-motivated economy, from self-centredness to love for our fellowmen. We must bring about self-conquest and banish untruth and violence from society. Until we do that there will be no peace in the world. We must attack this problem at the source. It is only by remoulding our daily lives that we can bring peace and plenty to this war distraught world and banish violence from our midst.

All of us are consumers. If we make a determined effort to use only articles made locally by village industries and base our economy on a self-sufficiency the bid we can make towards peace will be great.

—INDUSTRIAL FINANCE IN INDIA

By Sri A. K. SUR, M. A.,
Economist to the Stock Exchange.

INDIA has ample resources of raw material, man power and cheap fuel for industrial development. Unfortunately, however, she has not achieved much in that direction. One of the major difficulties that stand in the way of her industrial progress is the question of finding an adequate supply of funds for meeting the capital requirements of the industries. Such requirements generally fall under two heads: fixed capital and working capital. The former is sunk in land, building and machinery, while the latter is used to meet current expenditures such as the purchase of raw material, wages to labour, salaries to staff, establishment expenses and similar other "running" charges. So far as fixed capital and working capital are concerned, it is not likely that either of them will be returned in a short time, though it is reasonable to expect that current capital will be repaid before the loan for fixed capital is liquidated. In practice, however, working capital is secured by taking short-dated loans which are renewed at frequent intervals. The question is, therefore, one of long-term and short-term credit.

BANKS AND WORKING CAPITAL

As the situation is at the moment, industries in India are greatly handicapped by their inability to obtain sufficient banking and credit facilities with regard to both their fixed and working capital. Very frequently it comes to our notice, that an industry which might have proved successful, could not be started at all for the inability of the promoters to raise adequate funds for meeting the initial capital expenditure. At the same time instances are also not rare of well-established industries coming to grief for want of credit facilities to meet current expenditure. The financial difficulties of the industries are, therefore, both with regard to their fixed and current capital. So far as the existing banking institutions of the country are concerned they do very little towards relieving the burden of the industries. If they do afford any facilities, they are only with reference to their current expenditure. In other words, as a matter of general practice, where they do that at all, they invariably provide for only short-term accommodation, and are not in the least inclined to extend long-term credit to industries. Of course, they cannot but do this. Modern banks are mostly Deposit banks. Their funds are mainly the accumulated aggregate of the savings of a large number of individual members of the public deposited with them, and are withdrawable at short notice. It is, therefore, obvious that a bank for its own safety would follow a very cautious policy in respect of granting loans to its clientele. The management of the bank wants to have sufficient control over cash to be able to pay cheques drawn on it over the counter, either of the depositors or borrowers. It would make advance only on a full backing of tangible and readily marketable securities. It is this and this alone which is responsible for the present attitude of the banks to the industries. As for block capital, any advance by the banks towards this, would mean on their part a huge amount of unrealisable frozen assets that would endanger the liquidity of resources of the banks. It would indeed be expecting too much, to see a commercial bank supplying funds for meeting the capital expenditure of an industry. On this score Mr. W. Favill Tuke, Chairman of the Barclays Bank Limited of England, pointed it out in course of his address to the shareholders

at the annual general meeting of the bank for 1935 that affording long-term credit to the industries is outside the legitimate spheres of a deposit bank, and if the bank do that it would thereby sacrifice strength and solidity. They can render assistance to the industries only in regard to their current or working capital.

SCOPE FOR IMPROVEMENT

However, in regard to the grant of short-term credit facilities to the industries, there is much scope for legitimate improvement in India. The Imperial Bank of India which stands at the apex of commercial banking institutions of the country affords cash-credit facilities only to a very limited number of specially favoured customers, and that too only to supplement the extra capital required by an industry in the busy season. A similar stringent discrimination with regard to the credit-worthiness of the industrial borrower is also made by the Joint Stock banks of the country. They make advances to their customers only on the security of a selected list of goods and stocks,—generally raw materials or hypothecation of such manufactured goods as piecegoods, jute manufactures etc. Sometimes, of course, but in very rare instances, they do grant long-term credit to industrial concerns of sound position, but here too only on tangible and easily realisable securities. Next come the Exchange banks, which on account of recent diminution in their bill business, are now also offering credit facilities to the Indian industries, somewhat on the cautious line of the joint stock banks. As for the indigenous bankers and the co-operative banks they are practically of no help for the financing of the industries.

The relation between the banks and the industries is thus not very intimate in this country. As stated above, some of them render credit facilities to the industries—but instances are few and far between depending as they are on the credit-worthiness and good name of the borrowers. Industries in general, therefore, are provided with very little banking accommodation for their legitimate promotion and development. Moreover, the rate of interest charged by the banks to their industrial customers is very high, ranging at it does from 6 to 12 per cent. in normal times. The advantage of the low rate of the Imperial Bank, as explained above, is secured by only a few of the industrial borrowers.

So much with regard to the accommodation of working capital or short-term loans. Fixed capital or capital on block account is as a matter of general and wide practice raised by public or private subscription,—and that too depending on the good name of the promoters or the soundness of the proposition. But with regard to this, public opinion is very ill-educated in this country, and capital extremely shy.

MANAGING AGENCY SYSTEM

Here in this connection, we cannot but refer to the institution of Managing Agent which is peculiar to the Indian soil. For the majority of industrial concerns in this country, the chief financing is done by the Managing Agency, which concerns itself in financing, promoting and controlling the industrial companies. Almost like the mixed banks of the Continental type, they have hitherto acted as the issue houses, company promoters and industrial financiers. Owing to inefficient direction, lack of technical industrial skill, absence of commercial banking facilities, lack of ample resources, lack of touch with investing public, selfish greed in securing high profits for themselves, and promotion for the kith and kin, no great extension, or speedy and sound industrial development, could ensue under their care. In the countries of the West as also in Japan in the East, there are institutions of some sort

or other, generally of the type of issue houses, investment trusts or industrial banks that provide ample facilities for long-term credit to the industries. The State too in those countries has assisted the industries in this respect. But unfortunately, India has not as yet achieved much in this respect.

THE AHMEDABAD METHOD

Confidence of the investors in the financial status and business acumen of the people who manage and control a concern is undoubtedly the paramount factor in attracting capital to it. It is no wonder, therefore, that the early managing agents principally drew capital for the concerns founded by them from their friends and acquaintances who knew them thoroughly. The typical way in which the cotton mills of Ahmedabad were founded by the managing agents has thus been reported by the Central Banking Enquiry Committee: "Generally speaking, the total block capital required for starting a cotton mill in Ahmedabad is about Rs. 20 lakhs, and of this Rs. 5 lakhs is initially found by share capital. As regards the balance in the case of the old mills, 65 to 75 per cent. of the capital outlay has been financed by deposits and by funds supplied by the managing agents. These deposits used to be generally for one year. In the case of new mills, out of Rs. 20 lakhs required to finance the block capital, Rs. 5 lakhs is raised by share capital and the balance is found in the form of seven year deposits for Rs. 5 lakhs and one-year deposits or the managing agents' own capital for the remaining Rs. 10 lakhs. These seven-year deposits are encouraged by the grant to the depositor of a share in the agency commission. The managing agency is made into a limited concern with a nominal capital of Rs. 1,000, there being 1,000 shares of Re. 1 each, and one who comes forward with Rs. 5,000, that is to say, Rs. 3,000 in the shape of ordinary share capital and Rs. 2,000 in the shape of deposits for a fixed period of 7 years is given one share of the managing agency or one-thousand share of the agency commission. This one rupee share has considerably more value than its nominal value and in some cases it is worth Rs. 700 to Rs. 800. As far as the Ahmedabad industry is concerned, the system is reported to have succeeded beyond ordinary expectations and it is even doubted if the industry would have progressed as well as it has done in recent years, had it not been for the system of giving out shares from the managing agency commission".

STATE AID TO INDUSTRIES

The problem of financing the industries was studied by the Indian Industrial Commission as early as 1916, and they made sundry recommendations on that score. In short, they recommended two things. First that the Government should render financial assistance to the industries, and secondly that there should be set up in this country industrial banks of the type as prevailing in the countries of the West. They further recommended that the Government assistance should take two different forms: one with regard to the small and cottage industries, and the other with regard to the large-scale industries. For the former the giving of direct loans or the supply of plants on the hire-purchase system is suggested. For the latter it is suggested, that it should be by way of advancing loans, or of guarantee of dividends, or of undertaking to furnish share-capital in certain cases where private capital was not forthcoming. But any one having a knowledge of the mechanism of industrial finance in the countries of the West would not advise that the Government should directly participate in financing of large-scale industries, except the rendering of financial assistance to deserved ones in the shape of subsidies, bounties and protection. Direct financing can be

recommended only for the cottage and small-scale industries, and that too through the Statutory Boards as provided in the State Aid to Industries Act of the several provinces. But here too a caution needs to be exercised as to whether the manufacturing process followed by the firm applying for assistance is really economic and that the products manufactured have a reasonable chance of competing with similar products in the open market. There can, moreover, be set up a chain of co-operative banks for the financing of cottage and small-scale industries.

INDUSTRIAL FINANCE CORPORATION

Of late on the line of similar institutions in the United Kingdom and Canada, the Government of India have set up in this country an Industrial Finance Corporation. Inaugurated on July 1, 1948, the Industrial Finance Corporation has for its purpose the provision of medium and long-term finance to public limited companies and co-operative societies registered in India, including the acceding States, and engaged in the manufacture or processing of goods or in mining or in the generation or distribution of electricity or any other form of power. Individuals, partnership firms or private limited companies are thus excluded from the purview of the Corporation's operations. The authorized share capital of the corporation is Rs. 10 crores, divided into 20,000 shares of Rs. 5,000 each, the paid-up capital being Rs. 5 crores divided into 10,000 shares of Rs. 5,000 each, of which the Central Government and the Reserve Bank of India have subscribed Rs. 1 crore each, the scheduled banks and financial institutions, like insurance companies and investment trusts Rs. 1.25 crores each, and co-operative banks Rs. 50 lakhs. The paid-up value of the share capital and dividends on it at the minimum rate of 2½ per cent. per annum are guaranteed by the Government. Although the minimum rate of dividend has been fixed at 2½ per cent., the gross return to the shareholder is 3.27 per cent., if allowance is made for the incidence of income tax borne by the Corporation itself. The Corporation is authorized to borrow up to five times the amount of its paid-up capital and reserve fund. When the reserve fund equals the authorized capital of Rs. 10 crores, the borrowing capacity of the Corporation will be Rs. 100 crores. The Corporation may also accept deposits for periods of not less than five years, but the total deposits accepted may not exceed Rs. 10 crores. It is empowered to provide financial assistance in the following ways: (i) grant loans or subscribe to debentures of industrial concerns repayable within a period of 25 years secured by sufficient pledge, hypothecation or mortgage of tangible assets; (ii) underwrite the issue of stocks, shares, and debentures; (iii) guarantee loans floated in the market repayable within a period not exceeding 25 years. It is prohibited from subscribing directly to the shares or stocks of companies. The Corporation is thus primarily a lender and not a partner in industry. Its policy broadly stated, is to finance the acquisition of fixed assets, namely, land, buildings, plant and machinery, or extension of the same; its aim is thus to supplement rather than compete with the activities of commercial banks. Applications for loans are examined with reference to (a) the financial position of the company as revealed by a study of balance sheets or an inspection of the accounts and assets, (b) the importance of the industry in the economy of the country and the prospects for the success of the scheme. Further the concern applying for assistance would have to provide a reasonable proportion of the required finances through its own capital, before it could receive any aid from the Corporation. Unfortunately, however, the operation of the Corporation is not

being conducted on the lines as should be desired. So far as Bengal is concerned, it is sad indeed that in the very first instance big loans have been granted to companies with which the Chairman of the Corporation is identified.

ROLE OF INVESTMENT TRUST

For the economic welfare of the country, the vast amount of India's savings cannot any more be allowed to lie dormant and unproductive. These vast resources are to be mobilized for the economic wellbeing of the country. This can best be achieved by the creation of proper investment facilities. A type of institution that brings investment facilities to the door of the small savers in the West is the Investment Trust. There are, of course, a handful of investment trusts in this country. Their purpose is to pool the savings of many individuals and employ those funds in diversified investments under continuous specialized management. But what is wanted in this country are investment trusts of the type of fixed, flexible and unit trusts in England. They help the small savers and protect their interests by means of expert and specialized diversification of risks. About the rather parlous position of the small investors (and the shyness of industrial capital is mainly due to this) Dr. Burtchett very aptly observes: "Sober reflection upon the stark realities of the modern capitalistic system might well cause any investor to wonder how the common man can hope individually to cope with its complexities. The myriad of securities which he has the opportunity of purchasing, each with its individual characteristics, engulfs his puny analysis and overcomes his judgment. He knows not what to buy, nor how much. Experience may help some: prolonged intensive study both of his personal problems and of the various investments, will help more: but few investors, and particularly small investors of the laburing classes, have time or opportunity to adequately evaluate investment possibilities. Hence, an organization affording both expert counsel and diversification, otherwise impossible to the investor of small means appealed to the sober judgment of the individual who had been sorely beset to keep his capital, to say nothing of his difficulties in securing adequate and regular income therefrom." The helpless position of the small investor in the modern investment world thus analysed, is sufficient to show what a useful purpose the investment trust serves to them.

NEED FOR INDUSTRIAL BANKS

While the investment trusts will certainly serve a very useful purpose in mobilizing the savings of individual investors and ultimately providing for their employment in industries, but for any worthwhile solution of the problem of industrial capital in this country we must lose no time in establishing industrial banks and industrial corporations all over the country. What an industrial bank does was clearly described by the Macmillan Committee: "The functions of an industrial bank is to act as financial adviser to existing industrial companies; advise in particular as to provision of permanent capital, in amounts and types; secure the underwriting of, and issuing, the company's securities to the public, if necessary, assist previously in arranging for the provision of temporary finance in anticipation of an issue; assist in financing long-term contracts at home and abroad or new developments of the existing companies, or found companies for entirely new enterprises; act as intermediaries and financial advisers in the case of mergers or in the case of negotiations with corresponding international groups, and generally be free to carry out all types of financing business."

(Continued on page 176)

—DEVELOPMENT OF FISHERIES

By Sri SUNDER LAL HORA, D.SC., F.R.S.E., C.M.Z.S., F.R.A.S.B., F.Z.S.I., F.N.I., *Director, Zoological Survey of India. Indian Museum, Calcutta.*

"The need of India to-day is leadership from among her own people; leadership not of impulsive enthusiasm, or of prejudice, but of matured judgment and conscientious conviction".

INTRODUCTION

WHAT seemed to be true in 1888 at the time of founding tht Isabella Thoburn College for Women at Lucknow in the general context of India's backwardness is essentially true to-day in developing nation's food resources. We want leadership from among Indians who know the past traditions of the nation and have studied with sympathy and vision the present conditions of the operatives in the food industry and not the leadership of the visionaries, who have built their faith by studying foreign practices not suited to the Indian soil, the genius of its people and the economy of its peasants and fishermen. At the United Nations Scientific Conference for the Conservation and Utilization of Natural Resources held at Lake Success (17th August to 6th September, 1949), considerable attention was paid to the needs and requirements of the so-called under-developed countries and the feeling in the Fishery Section was that "we would build on ancient skill and spread it by scientific understanding." No other method for developing natural resources in backward countries can be effective or ever-lasting. Recently I looked into the Fishery Laws of Asoka as enunciated in his Pillar Edict V and marvelled at the insight our ancestors had into the breeding habits of the food fishes of India. I can say with scientific exactitude and national pride that, in the present state of fishery knowledge in India, Asoka's fishery legislation cannot be improved upon, though the possibility of extending it through scientific understanding is not ruled out.

On the last day of the meeting, the Fishery Section of the United Nations Scientific Conference discussed the possible steps that should be taken in developing the fishing industry of any country—advanced or under-developed—and came to the conclusion that "for the best use and development of fish production, the following activities are required:—

"Finding out and making known the resources; research into consumption, processing, distribution and marketing; research into methods of capture, including the use of sonic and other aids and improvement of craft, equipment and gear; raising the technical standard of efficiency in the industry."

FIRST STEP

In the discussion, there was considerable emphasis on the need of "Consumption Research." It is a well known fact that there are prejudices against certain types or qualities of food, but it is equally well-known that consumer tastes change irrespective of price. This imposes on the industry the need to study the reasons for these changes in consumer habits and the need to devise new and more acceptable forms in which to market their products. Those who favour fish canning industry in India must know that fish canned in the European or American style has a very limited market whereas fish cooked in the Indian style and then canned has

immense possibilities. The Herring Industry of Europe is going to undertake a study of the tastes of the peoples of Asia and Africa so that they can process Herring in a form acceptable to these people. In India, so far as I am aware, no attention has been paid to "Consumption Research," concerning the Fishing Industry.

Dr. W. F. Thompson, Director, Fisheries Research Institute, University of Washington, with whom fishery development problems were discussed during my visit to Seattle, has very recently written to say:—

"I am convinced that intensive study of the economic condition and the needs of both consumer and the producer of fishery products is necessary before a great fishing industry can be developed in the way it should be. The alternative to this is to open your resources both of fiish and labour to foreign exploitations which I doubt you desire."

SECOND STEP

When the consumer tastes are known or have been developed, then comes the next phase of distribution and marketing, including processing. This implies that whatever is being already produced should be fully utilized and wastages should be avoided. Problems of refrigeration at various levels, salting, canning and transport will have to be investigated, bearing in mind the Indian conditions. The correct approach to marketing will be to try and expand whatever sensible practices exist in the industry already through judicious and well-balanced subsidies or other forms of encouragement to the trade.

THIRD STEP

Once the consumer preferences are known and distribution is properly organised, the question of maintaining production becomes the most important and attention must then be paid to "Capture Research." Here again, expansion of the existing methods and the improvement, through hybridization, if necessary, of the existing craft and gear will prove to be the most effective means rather than the use of the highly developed techniques of the foreign countries. In any case, the value of production economics should always be borne in mind in suggesting improvements.

At this stage, it is imperative that due consideration should be paid to the Conservation or proper Management of the country's fishery resources. These renewable biological resources are likely to deteriorate very rapidly if there is any laxity in their management, for over-fishing and wanton destruction of the young and immature fish can lead to a rapid decline in the yield from the fishery. There should thus be a provision for the investigation and full but wise use of the resources.

FOURTH STEP

The next step in fishery development is "Exploration Research." This implies that the available and known fishery resources are properly used and to meet either the local demand or of the demands of export market, a further expansion of the industry is necessary. During this phase one must bear in mind that any improvements in catching methods should be economical as compared with the existing practices, and for this reason present-day catches and their costs should be borne in mind.

FIFTH STEP

To test the efficacy of the results of exploration, pilot-scale novel projects will have to be undertaken. The pilot projects should be large enough to yield

industrial results but at the same time small enough to be economical.

Model fishery schools are a great necessity in India. With proper plannings such schools can pay for themselves. What is required for industrial development of any nature are (i) suitable organization, (ii) financial stability, and (iii) able direction. For these, we require men of vision, but not visionaries; funds but not very much beyond the Indian economy and leadership of matured judgment.

DR. F. W. THOMPSON'S VIEWS

In Dr. Thompson's opinion, "the economic advance of the people of India as a whole will be the one most important thing which will secure an adequate use of fisheries. If India can produce its own fishing gear, fishing engines, oil, transportation equipment, and all of those things which are necessary to carry out fishing enterprise, India will be that much ahead. This is so because India will continually be under a heavy handicap as long as she must import materials produced by labour costing far more than her own."

FISHERY OPERATIVES

Now we are in a position to consider the very basic requirements of the industry, that is the development of India's human resources. I am informed by Dr. R. Van Cleve, Acting Director, School of Fisheries, University of Washington, that the farmers in the U.S.A., once contemptuously called "hay-seeds," have attained their present high status through their own efforts.* Though it is basically true that any group of people can attain a higher social position through their own efforts, the structure of society in India is different owing to the prevalence of Caste System among the Hindus and its repercussions on other religions as well. However, the Republic of India has declared equal opportunities for all, but this will take many years when fishermen will begin to enjoy the same status as a Brahmin at his birth. While this social disability of the fishery operatives will take years to be eradicated, the State can give them an opportunity for education through the establishment of fishery schools throughout the country where they could not only be taught technical subjects dealing with better fishery methods, production economics, marketing economics, but could also study cultural subjects, such as literature, history and economics. Thus they will not only be educated as better fishermen, but better citizens taking an active part in their communities and in national affairs. Against the background of Indian conditions, besides the self-efforts of the fishermen, a well-planned and properly regulated plan of improving the status and socio-economic condition of the fishermen is most urgently needed if fishery development is to be placed on a sound basis.

FISHERY TRAINING

To make a proper use of the fishery operatives and fishery resources of the country, you want a band of trained personnel who can canalise the activities and direct them along proper channels. They will have to forsake their impulsive enthusiasm and prejudices against indigenous practices and build their programmes on ancient skill, current prac-

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*Dr. J. L. Kask, Chief Biologist, Fisheries Division, FAO has, on the other hand, very kindly informed me that "The farmer in the United States has always been held in high esteem socially and I believe his present happy economic status, which is shared by industrialists and other workers, is the result of general economic progress of the country rather than any special effort on the part of farmers. Also, in part at least, as pointed by Mr. Gerhardson, is due to the (government) subsidies they enjoy".

tices and scientific understanding. The education of such people for the objectives enumerated above must be in the country itself. A very large number of persons required for an Extension of Knowledge Service and they must be such who can understand and work under Indian conditions. Even for leadership, knowledge of the Indian conditions is most essential and such wise leadership cannot possibly be borrowed from abroad but must come from among India's own people. In developing natural resources, far more value must be attached to experience of operations than to high academic degrees. Exchange of ideas and travels abroad are helpful in widening knowledge but they cannot replace local experience. I have now travelled in Europe and the U.S.A. in the West and in Philippine, Hong Kong, Siam and Burma in the East and have had the privilege of discussing fishery matters with representatives of a large number of nations. It is my belief and conviction that the best country for Indian students to go for fishery training is Indonesia where the Dutch have done considerable spade work in fishery development against the background of the economy of the Asiatic people. Most of the methods and practices evolved by them are applicable to Indian conditions.

CONCLUSION

In conclusion, I must repeat what I have stated so often already that any lasting or nation-wide development of fisheries must be a slow and gradual process of the evolutionary type. Any hurried spectacular measures are bound to fail. For any immediate increase in fish supplies in the present-day peasant economy of Indian fisherman, it is necessary to carry out a large number of smaller, less ambitious, but economically sound projects, which will in the aggregate, increase production considerably.

POST-SCRIPT

After the above had been written, in the Statesman of the 27th February, 1950, the following note appeared under the caption "Scientists need Social Outlook":—

New Delhi, February 24: — Pandit Nehru to-day asked scientists to keep in view "the humble folk who live far away in the distance and not near around us" while applying their knowledge and skill to solve the country's problems.

The Prime Minister said that specialists in various fields often lost sight of the "human aspect" of the problems in which they dealt and specialized. "The problems of life are the problems in human beings. The essence of wisdom lies in the scientists, economists and engineers combining their knowledge with a human approach to different problems."

He called upon the scientists to develop what he termed a "social outlook." He added that something more than social outlook was necessary. This might be described as a revolutionary outlook—but not in the sense of bombs and fireworks.

He said that in his younger days he used to say perhaps in arrogance that there was no such thing as the "inevitability of gradualism" in the solution of problems. "But more and more as months pass by I see that gradualism is inevitable and things have to progress gradually."

Regarding the development of the fishing industry in India, the writer has been constantly pointing out the basic principles underlying "inevitability of gradualism" and the great need for "Social Outlook." If Government officials in high positions have also become converts of the views expressed above, the solution of the Food Problem will not be difficult to find.

—FINANCES OF STATES 1950-51

By Sri S. N. PANIGRAHI B.A., B.COM.

SO long as inflationary conditions persist we cannot be sure, despite widespread talks about the need of enforcing strictest economy and other anti-inflationary measures, whether any substantial decrease has been brought about in the present inflated size of the States' finances. Reduction of wasteful expenditure is urgently necessary for fighting inflation and high prices; but despite half-hearted cuts in central grants to states, no earnest attempt is so far visible in the direction of curtailing unproductive expenditure, especially on the so-called development schemes, which are in any case not so urgent as increasing production by reducing inflationary pressure, possible only when government disbursements on luxurious developmental schemes are reduced substantially.

The total budgeted revenues of the nine major state governments are seen to have risen from Rs. 273.36 crores in the original estimates for 1949-50 to Rs. 294.05 crores in the revised estimates for that year and to Rs. 282.10 crores in the original budget estimates for 1950-51. Total expenditure of all the states has similarly increased from Rs. 275.76 crores in the budget estimates for 1949-50 to Rs 292.58 crores in the revised estimates for that year, and to Rs. 284.26 crores in the budget estimates for 1950-51.

The following two tables show the revenues and expenditures in each of the nine major states during 1949-50 and 1950-51 :—

Table I

(Revenues in lakhs of Rs)

	Budget Estimate, 1949-50	Revised Estimate, 1949-50	Budget Estimate, 1950-51
Bombay ..	52,86	62,62	61,39
Madras	55,75	56,91	55,21
Uttar Pradesh	55,73	56,26	52,27
West Bengal	31,83	34,73	33,90
Bihar	24,44	27,42	25,90
Madhya Pradesh	19,00	18,82	17,58
Punjab (India)	15,93	17,24	16,18
Orissa	8,90	10,98	10,66
Assam	8,92	9,07	9,01
Total	273,36	294,05	282,10

Table II

(Expenditures in lakhs of Rs.)

	Budget Estimate, 1949-50	Revised Estimate, 1949-50	Budget Estimate, 1950-51
Bombay	52,41	62,73	61,37
Madras	55,66	56,38	55,57
Uttar Pradesh	55,58	56,23	52,21
West Bengal	32,94	33,26	35,23
Bihar	19,17	26,54	26,27
Madhya Pradesh	18,80	18,53	16,17
Punjab (I)	22,92	16,83	16,14
Orissa	8,76	12,42	11,42
Assam	9,52	9,66	9,88
Total	275,76	292,58	284,26

REVISED REVENUES, 1949-50

The principal reasons for the increase in revenues from Rs. 273.36 crores in the original budget estimates for 1949-50 to Rs. 294.50 crores in the revised estimates for that year are the following:—

(i) Increase in area due to the merger of the ex-Indian states with the neighbouring provinces (now known as states), notably of Bombay, Madhya Pradesh and Orissa.

(ii) Increase in the provincial share of income-tax from Rs. 41 crores to Rs. 45 crores.

(iii) Increased yield of taxation from within the province.

(iv) Original under-estimating of revenue receipts, which has become habitual with all states.

Against the above increases, total central grants for development to all states have decreased by only Rs. 3 crores from Rs. 27 crores to Rs. 24 crores in 1949-50.

REVISED EXPENDITURE, 1949-50

The increase in expenditure during 1949-50 from Rs. 275.76 crores in the original estimates to Rs. 292.58 crores in the revised estimates is mainly due to the increase in the area of some states arising out of the merger of the ex-Indian states with the old provinces. But the increase in expenditure seems to have been not entirely due to the increased area only, but was also the result of an unusual eagerness to spend maximum amounts possible for purposes of window-dressing. Despite warnings from many quarters no state seems to have heeded to enforce economy. Despite the slight cutting down of central grants for development schemes, the states found money from their own resources for maintaining the present tempo *increasing* expenditure.

REVISED NET RESULTS, 1949-50

(In crores of Rupees)

	Original	Revised
Revenue	273 36	294.05
Expenditure	275 76	292.58
Deficit (—)	(—)2.40	
Surplus (+)	-	(+)1.47

Originally three states, West Bengal East Punjab and Assam anticipated deficits, but now deficits are expected in Bombay, Orissa and Assam. The overall original deficit of Rs. 2.40 crores has been converted into a surplus of Rs. 1.47 crores in the revised estimates, and eventually when the actuals for 1949-50 are made available, the surplus for the year 1949-50 may happen to be much bigger. So far as the deficit group of states is concerned, budgeting accuracy has been shown only by Assam, and due undoubtedly to certain indeterminate factors, accurate estimating has not been possible in West Bengal, East Punjab, Bombay and Orissa. Certainly more care and foresight are called for.

CAPITAL EXPENDITURE

The figures given above relate to the revenue account only. I have not kept track of capital expenditure incurred in 1949-50 or/and that proposed for 1950-51. But one thing is certain that so far as the year 1949-50 is concerned, the large amounts originally allotted for capital expenditure have not been fully utilised during the year. The reason for less capital expenditure than provided for is not exactly financial stringency or even the cutting down of central loans. The shortages of materials, machinery and technical personnel inevitably held up the starting of new capital works and slowed down the progress of the existing ones. The inevitable gap between promise and performance,—between formulation of plans and their execution—and the public apathy towards some of the capital schemes like state Road Transport explain the under-spending on capital account. Furthermore, for purposes of "window-dressing" large sums are provided for spectacular expenditure on capital schemes, even while fully realising the impossibility of taking up the schemes for exceution during the year.

ESTIMATED REVENUES, 1950-51

For 1950-51 the revenues are estimated to fall from Rs. 294 crores in the previous year to Rs. 282 crores.

Reasons for the expected fall are the following:—

(i) The usual under-estimating of revenue receipts.

(ii) Cutting down of central grants for development from Rs. 24 crores in the previous year to Rs. 10 crores in the budget year 1950-51, partly counterbalanced by more "grow-more-food" grants and procurement bonus from the centre.

(iii) Less estimated receipts from Sales Tax, Loss of excise revenue due to prohibition, etc.

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—FISCAL POLICY OF INDIA

By Sri K. M. NAIK

There is, however, no difference of opinion to the country so far as the need for increased production is concerned. Everyone from the Prime Minister to the man in the street is agreed that production must be increased, more wealth should be created and the sub-human standard of living of the masses must be raised. But when it comes to the method and manner of achieving the foregoing objectives then sharp differences of opinion emerge. Much before the necessary quantum of production has been achieved and wealth created, there has been distracting talk and controversy about distribution, although even in the Government of India's statement on Indusrtial Policy it is clearly recognised and admitted that "*any improvement in the economic conditions of the country postulates an* increase in national wealth; a mere redistribution of existing wealth would make no essential difference to the people and would merely mean the distribution of poverty." It is, therefore, not surprising that as a result of what we have been doing, we are merely distributing our poverty without adding to the national wealth, leaving the country the poorer in the process. There is no doubt, the Government of India are seized of the problem; but it should be remembered that if industry is to realise the objectives aimed at, the assistance offered to it should be prompt, adequate and effective. It is in three directions that this assistance can be given: (1) in the matter of taxation; (2) availability of raw materials and (3) freedom to industry from anxiety as regards its future.

The one other way which suggests itself to me is the formulation of a proper fiscal policy. This question is already under the examination of the Fiscal Commission and no doubt their well-considered and valuable recommendations will receive careful consideration of the Government. But this much I must say that the triple formula of discriminating protection recommended by the last Fiscal Commission, hedged as it is by rigid conditions and a cumbrous and round-about method of application, has failed in its primary objective, as a state policy, of promoting and fostering an all-round industrial development of the country. It has been unable to exert any powerful influence on economic reconstruction, provide the initial impetus to industrial development and offer a potent safeguard to future consolidation of industry. Nor has it been able to create the much desired industrial atmosphere in which new industries could grow and develop and there could be a greater diversification in production than has been the case hitherto. Protection has no doubt been given to certain industries but protection cannot by itself ensure industrial development unless it is broad-based, adequate and dynamic in nature. When our main industrial problem is "of the absence of industrial atmosphere — confidence of capital, inertia and momentum of start" —what we require is a positive Fiscal Policy geared to and integrated with our general economic policy so designed as to ensure rapid economic development of the country.

Of the many recommendations to the Fiscal Commission, I would particularly like to mention one. It has been suggested that the Fiscal Commission should draw out a schedule of industries which it is essential to protect in the national interest. Such industries should be pro-

tected for a definite period by the levy of import duties fixed at a prescribed rate. The period of protection should be sufficiently long to enable the industries falling within the schedule to stabilise themselves. Protection to the scheduled industries should be granted without any previous enquiry by the Tariff Board. Only if a particular industry within the schedule finds the duty to be inadequate it might be revised after an enquiry by the Tariff Board. But in no case should there be any reduction in the rate of the import duty fixed by the Government. In drawing up the schedule, the primary consideration should be that the industries selected are defence and key industries. The schedule of industries drawn up should not be a long one and additions to the same might be made from time to time by the Government of India. The Fiscal Commission should also submit their considered views to the Government of India on certain other aspects of the problems facing the industry, such as incidence of taxation, incentive to saving and investment, etc., and other non-fiscal measures, like favoutable railway rates policy, anti-dumping legislation, countervailing duties, supplies of cheap raw materials, cheap power or fuel, essential plant and machinery, adequate technical assistance and facilities for technical reasearch, etc. Further, they should also make recommendations for encouraging a steady flow of adequate capital to the protected industries.

NECESSITY FOR REALISTIC APPROACH

The Government of India have a number of industrial projects under contemplation. The Sindri Factory has been under construction for some years and is much behind schedule. The final cost, it is understood, will be very much higher than the original estimate—about 100% higher. In the case of the two iron and steel plants, too, the new estimate is given at Rs. 90 crores each against the previous figures of Rs. 50 to Rs. 60 crores each. Government have entered into agreements with foreign firms for erection of a machine tool factory estimated to cost Rs. 16 crores approximately; a factory for the manufacture of communication cables with a total capital investment of about Rs. 1 crore; a factory for the manufacture of Penicillin and Sulpha drugs of which the revised estimate is understood to be Rs. 4 crores against the original estimate of Rs. 2.6 crores. Besides, the locomotive manufacturing works at Chittaranjan is to cost about Rs. 14.75 crores. Then there is the project for the manufacture of heavy electrical power plant and machinery, which is being investigated into. The total cost of this plant, on the basis of rough estimates, will be between Rs. 16 to Rs. 20 crores. There are also schemes for the manufacture of synthetic petrol and shipbuilding. The first thing that strikes one as rather curious, on an examination of these schemes, is that there is a tendency for the original estimates and later estimates to vary widely. And the oher point that arises is whether with the present capital resources of the country it will be possible to finance such vast schemes involving as they do huge capital expenditure. Then also the question arises whether it is not prudent for the Government to acquire the requisite experience and industrial "know-how" from the projects they have already in hand before extending their activities further. As it is, there is still a great deal to be done in the way of improvement and attaining the desired pitch of efficiency in the case of the existing state-owned commercial concerns, such as the railways, telephones, etc. Ordinarily in the commercial world a business concern would first try to consolidate its position before expanding its activities. Similar should also be the case

when Government elect to enter business. In fact, Government, who spend the general tax-payers' money, need to follow a more cautious policy, because failure of a Government venture is likely to shatter the confidence of the investors to a much greater degree and create more far-reaching repercussions than would happen in the case of an ordinary business concern. With the condition of the market as it is, the effect of such failure would be nothing short of a disaster. I, therefore, venture to submit that the approach of Government to this question should be realistic, bearing in mind the limitations of the available capital resources of the country and the experience Government have of running business enterprises. As practical people facing the hard realities of life, it should be our endeavour first to find a way out of our present difficulties and not complicate them further by creating fresh problems. We have enough on our hands for the present and let us, therefore, concentrate on them for the time being, because, otherwise, we would only be dissipating our energies and resources without achieving tangible results.

(Continued from page 167)

DEVELOP CAPITAL CONSCIOUSNESS

As we have already seen capital in India is not only shy, but it is put to unproductive uses. The very first thing that we shall have to work hard for at the very beginning is the development of Capital Consciousness on the part of the masses. Let India's masses adapt themselves to the habit of corporate ownership of wealth in substitution of direct ownership of private property,—let corporate ownership be widely practised in this country, so that industrial financing may assume a new and greater significance in future.

(Continued from page 173)

I will not be surprised if the revenue receipts for 1950-51 eventually turn out to have been deliberately and grossly under-estimated, i.e., actual revenue will certainly be substantially more than what has been anticipated.

ESTIMATED EXPENDITURE, 1950-51

These are estimated at Rs. 284.26 crores as against Rs. 292.58 crores in the previous year. The reasons for the welcome fall in expenditure are the following:—

(i) Reduction in the so-called post-war development schemes.

(ii) Reported economy measures.

Since the revised estimate of expenditure for 1949-50 which was Rs. 292.58 crores may however actually turn out to be substantially less than that amount when the accounts are finally closed. I am not inclined to think that the above two reasons for the apparent reduction in anticipated expenditure in 1950-51 are really the true reasons for the reduced expenditure in 1950-51. Comparison of the estimated expenditure for 1950-51, viz. Rs. 284.26 crores, with the originally estimated expenditure of Rs. 275.76 in 1949-50 shows that there has been actually an increase in expenditure. The effects of reduction in development expenditure in particular and of economy measures in general, contrary to what has been made out by almost all of the states Finance Ministers, will, I am afraid, prove illusory.

—INDUSTRIAL STATISTICS

By Sri ***MAHESH CHAND****, University of Allahabad.*

IT is usual to think in terms of "scope of industrial statistics," "their uses" "what industrial statistics are collected in India and abroad," "the study made of the collectid statistics" and "the applications of the results of such studies."

What is more important to us in India is the need for the realisation by the producers and industrialists of the importance of industrial statistics. Once this is realised, there shall be a more active and real co-operation by the producers for the collection and analysis of industrial data.

The term 'industrial statistics' relates to all statistics concerning non-agricultural production. India is on the threshold of a tremendous increase in such production. Unlike Europe, the United States of America rose to the present industrial heights on account of a long political peace, a vast 'one currency, one customs' market and the benefit of the experiences and progress already made in Europe. True, like Europe, India also has a long line of well established old methods, but as things are, it is not difficult to overcome their resistance. In fact the people themselves clamour for the provision of facilities available to the producers of industrially advanced countries. Otherwise, India definitely has the last two advantages of U.S.A. and we hope to have soon the advantage of a long era of peace also. In the circumstances, it is essential that we must make ourselves ready with all relevant data to speeden the progress of industrialisation. We must therefore know what industries exist in the country and what is their distribution, position, economy, etc. The Government of India is collecting through the Directorate of Industrial Statistics and under cover of the Industrial Statistics Act, 1942, certain information about a number of factory-industries. We shall refer to these later, but we may emphasize the urgent need for a first-stage survey of the cottage and small scale industries on a district basis. In many cases it shall be to the advantage of the manufacturers if they take up this task themselves. It can help them to come together and pave the path to a new and large organisation. To give an example, Firozabad (U.P.) is famous for the Indian bangle industry, which is mainly a cottage industry. The exodus of the skilled labourers across our frontiers has almost snatched this industry from our hands. Few of those left behind know the art and particularly the art of colouring the bangles. An industrial survey of the bangle industry should have brought to the fore this peculiar feature—in our words, defect—and the investors could be exhorted to combine together and get others trained. Now they have to be exhorted—after a study of the relevant industrial statistics—to join hands and mechanise their industry.

However, every manufacturer is also a dealer. He has to dispose off what he produces. The product has to be described in terms of specified features and before the purchaser pays the price he satisfies himself that he has got a lot of merchandise which more or less possesses the originally specified features. He takes out some samples of (say) ten units of the commodity each and finds the fraction of defective units contained in the samples. If the fraction comes to be what he would neglect, he accepts the "lot" otherwise he rejects it. Once a big lot is rejected, it causes a great inconvenience and financial loss to the producer. He has to check the lot up, sort out the defective pieces and replace them. Knowing the preference of the

buyers, the producing firm would like to test the product himself in order to avoid the possibility of rejection, which may also be on wrong grounds. If the preferences and the proper industrial statistics be available, it is possible, with the help of statistical sampling, to avoid unnecessary risks of producers and buyers. Thus, assume that a plant is known to produce commodity of average quality (X') 35." with a mean range 14. Assume further that the producer does not want to run a risk of 2 chances in 100 that a lot will be rejected, and the buyer wants to run no more than 1 chance in 100 that he will receive a lot with average quality less than 30. The statistician demands that random samples of about 18 pieces each be taken from each lot and the average quality in the sample be noted. If the average quality falls below 32.65, the lot should not be supplied to the buyer.

In any industry the quality of the current output is judged against standards. The standards may have been fixed by the State, a technical commission, say, the Indian Standards Institution, or they may represent the quality of the product attained in the past. The standards must be maintained in regard to current output. If the quality of the output is higher than the standards, it implies wastage of labour and materials. If it is lower the disadvantages are obvious. In many cases the standard is set on the basis of past production, but the statistician knows that this standard can be used only if the data of past production are homogeneous.

A few examples of the need for standardisation may be given as illustration. Thus the Paint Industry in India is now in a position to meet a considerable part of our demand and we may well begin to export paints in the near future. Both for the consumer in India and abroad, it is essential that our products should be of the requisite quality, and comparable to the foreign products. We must therefore have standards, methods of testing, tests and statistical study of the results. Similarly, statistical tests and studies are continuously needed for the "pickers." The textile industry being the largest single industry in India, the demand for good quality pickers is great. Or again, water, which is used in large quantities in the textile industry must be analysed and the results statistically tested to detect water of objectionable impurities.

In many industries some of the tests are destructive. The commodity being tested gets destroyed, e.g., life of an electric bulb, tensile strength of a wire, maximum weight that can be supported by a metal sheet. In order therefore to reduce the expenditure involved by way of loss, recourse can be had to statistical sampling. But besides sampling, the expenditure may at times be altogether eliminated if the quality to be tested could be proved to be related to some other factor, whose test would not involve destruction of the commodity. Such indirect statistical tests are also preferable where it is desirable to save time. Thus it may be that the life of the electric bulb can be proved to be related to the quality of the filament. The thickness of the coating of zinc on iron sheets may be measured by the magnetic change in the galvanised sheets. The industrial statistician shall therefore fit a relationship between the quality to be ultimately calculated and that to be practically measured. Technically a regression line shall be fitted. He shall then assure himself whether the regression is significant or not. If it is significant, he goes ahead and uses the relationship to calculate the unmeasured quality with a specified degree of certainty. To take a practical example, there are warp breaks during weaving in the textile industry.

Can the warp breakage be forecasted from a measure of relative humidity? The table below gives the frequency of warp breakage at different relative humidity:—

Warp breaks (Y)	Relative Humidity (X) 68—	70—	72—	74—	76—	78—	80—	82—	Total.
0.0				2	5	5	1		13
0.8		1	7	13	28	28	11	4	92
1.6	2	6	16	27	44	35	9	1	140
2.4	1	5	24	24	27	17	3	2	103
3.2		2	16	6	15	9	2	1	51
4.0	2	1	4	7	7	5	1		27
4.8		1	2	2	3	2			10
5.6			1			2			3
6.4						1			1
Total	5	16	70	81	129	104	27	8	440

The relationship as established by the method of least squares is Y = 9.028—0.087 X. To assure ourselves of the validity of the relationship, recourse is taken to the analysis of variance followed by the F-test. In the present case it is found that the relationship is significant and can be used.

There are another class of problems to which the method of analysis of variance and the F-test can be applied. Thus the roller weightings affect the tensile strength of the yarn. The type of grid used influences the vacuum in the radio tubes. In the first example, the manufacturer has to select a roller weighting which shall maximise the tensile strength of yarn: or, he has to find out if the different weightings create any real difference in the strength. For, if they do not, he shall select the one which is the least costly and cumbersome.

We may refer to some more applied problems. A company may be receiving its supply of coal from two or more mines. The ash contents of the coal differ. The question arises, "Do they really differ?" Or again, a new drug has been invented as an alternative to one already in use. They are administered in turn to the same set of ten persons and the effects are noted. The effects are slightly different. The manufacturer would naturally like to know if the difference is real or merely due to "chance fluctuations." The answer would perhaps make or mar his future. Relevant industrial statistics and their analysis can enable the statistician to give the answer.

WAGE INCENTIVES

These are times when the efficiency of production of Indian industries has to be increased. One hurdle is the efficiency of labour and it is advocated that it be kept up through a policy *inter alia* of wage incentives based on the scientific measurement of productivity. The industrial statistician is essential to measure the productivity and help keep the wages policy in line with it.

BETTER INDUSTRIAL PURCHASES

From the point of view of an industry, it is highly desirable that they should study the statistics for those industries from which it buys and to which it sells. A knowledge of the production and sales trends of the supplying industries would enable the firms in an industry to gear their own production programmes properly to the trends, to take appropriate advantages of the seasonal operations of the suppliers and to buy and stock their requirements of fuel, stores, raw materials much more intelligently.

HIGHER EFFICIENCY

Within the industry a statistical analysis of the series of data relating to production, inventories, shipments and orders can enable us to find out any disequilibrium in operations. When the disequilibrium is subsequently remedied there

shall be a less wide fluctuation in the production, supplies and economies of the industry. What is true of the industry is also true in the case of the firms in an industry. Besides, reliable data about the industry enable an individual firm to gauge its own position in the industry. Measures of efficiency such as output per worker, labour cost, monetary costs, and employment per rupee output as also of the firm's share in the industry's total product enable a firm to check up its efficiency and to determine its role in the industry.

We have competitive industries as also monopoly producers. While one would readily agree to the necessity for studying the statistics concerning competitive industries by one belonging to the former category, it may sometimes be argued that the monopolist need not maintain series of its own results. This would be wrong. A study of the short and long-term movements of production in a monopoly concern is necessary for proper planning by management. As to the competitive industries, in the western countries the management decisions are not guesswork as they are in India. They are based on hard facts on statistics collected as a result of industrial surveys and censuses. The statistician is every day revealing interesting stories of inter-industry competition as a result of his study of the continuously compiled production data about the cotton, wool, silk, rayon and nylon industries; about the aluminium, steel and plastics industries; and about the metal, wood, cloth, and paper-container industries. Organisations of Indian industries have paid some attention to such studies and the necessity for the collection of the appropriate data, but the individual producers have yet to realise the importance thereof.

The Census of manufacture taken in India does not cover all the industries and the data have not been published district-wise. Even so the published data can be used to form regional a distribution chart for the various materials, equipment, fuels, electricity, lubricants etc. consumed by the different industries, Such charts should prove to be of great help to suppliers and producers of these materials. It can afford a good basis for the allocation of territories to salesmen and for planning tours effectively and economically. It would show the areas on which the sales department should concentrate.

Also the number of firms covered and the value of their products as also the quantity can enable us to form an idea of the average size of the production units by output also. The size of the firm also has a marked influence on the distribution and sales methods.

To one engaged in consumers market research, the production statistics provide a valuable checking up. Besides the production figures also offer an indirect measure of changing trends, demands, preferences etc. In U.S.A., for example, the demand for men's jacket was changing from the all fabric types to the leather type and this was evident from the production figures. A close study enabled the plotting of the trend of demand a few seasons ahead. But this is not possible in India just now and we will have to wait many years before such statistical studies can be attempted.

We have mentioned only a few of the general and specific ways in which industrial statistics can be used. No enterpreneur and manager can afford to be without continuous access to all industrial statistics relevant to his business. In future the Indian industries shall be highly competitive with continuous shifts and changes due to new materials, new processes and new products. So the need for fuller industrial statistics and their appropriate analysis and study is more vital than ever.

—UNION FINANCES, 1950-51

By SCRUTATOR

THE Budget estimates of the Government of India for the year 1950-51 as finally passed by Parliament stand as follows :—

Revenue

	In lakhs of Rupees
Customs	1,06,54
Union Excise Duties	71,50
Corporation Tax	38,10
Taxes on Income	80.90
Opium	1,55
Other Heads	6,96
Railways (Net)	6,37
Posts and Telegraphs (Net)	4,04
Debt Services	1,14
Civil Administration	7,86
Currency and Mint	9,52
Civil Works	1,27
Miscellaneous	2,73
Extraordinary Items	10
Total	3,38,59

Expenditure

	In lakhs of Rupees
Cost of Collection	13,81
Irrigation	23
Debt Services	36,50
Civil Administration	50,06
Currency and Mint	1,76
Civil Works	9,97
Miscellaneous	38,70
Defence Services (Net)	1,68,01
Contributions and Miscellaneous Adjustments between Union and State Governments	15,41
Extraordinary	3,44
Total Expenditure met from Revenue	3,37,88
Surplus	71
Total	3,38,59

In the Budget as presented by the Hon'ble Finance Minister the surplus disclosed was Rs. 1 ,31 lakhs, while as a result of the modifications in the Finance Bill accepted by Parliament the revenue under "Union Excercise Duties" will be reduced by Rs. 5 lakhs and that under "Taxes on Income other than Corporation Tax" by Rs. 55 lakhs. In the result the net estimated surplus of Rs. 1 ,31 lakhs for 1950-51 has been reduced by Rs. 60 lakhs to Rs. 71 lakhs shown in the above statement.

The modification made by Parliament in "Union Excise Duties" related to a slight lowering of the excise duties on matches and that in "Taxes on Income other than Corporation Tax" related to the raising of the exemption limit for the levy of income-tax from Rs. 3 ,000 to 3 ,6000 in the case of individuals, unregistered firms, and associations, and from Rs. 6,000 to Rs. 7,200 in the case of Hindu undivided families.

In India those who are called upon to pay income-tax form a bare 0.25 per cent of the population, as seen from a brochure prepared by Mr. A. C. Sampath Iyengar, entitled "Are Our Taxes Realistic or Rational?" The other 99.75 per cent of the population pays no income-tax at all. In the U.K. about 44 per cent of the population pay income-tax; in the U. S. A. about 37 per cent; in Australia about 34% ; while in Canada they number about 20%. Although these figures may be a little exaggerated, and although we have no such figures in respect of advanced countries of the East like Japan, China, Siam, Burma and Pakistan, there is little doubt that Parliament in raising the exemption limits reduced the already small number of incometax payers in India and to that extent it was a reactionary step.

The changes made in taxation were the following :—

(*i*) Business Profits Tax was abolished.

(*ii*) Reduction in the rate of income-tax payable by companies from 5 annas to 4 annas but the company super-tax was raised by half an anna.

(iii) Reduction of tax payable on slabs of personal income between Rs. 10,000 and Rs. 15,000 by half an anna, from 3½ annas to 3 annas.

(iv) Reduction of the tax on the slab of income in excess of Rs. 15,000 from 5 annas to 4 annas.

(v) In the field of personal super-tax, the distinction between earned and unearned income is abolished.

(vi) Reduction of the maximum rate of super-tax from 9 annas for earned income and 10 annas for unearned income to 8½ annas.

(vii) Raising the exemption limit in respect of the Hindu undivided families to Rs. 6,000, which was further raised by Parliament to Rs. 7,200.

(viii) The exemption limit on personal incomes, incomes of unregistered firms and associations was raised by Parliament from Rs. 3,000 to Rs. 3,600.

(ix) Income from buildings that may be constructed within the next two years will not be liable to tax during the two years in question. A depreciation allowance will also be given for business premises constructed in the next two years.

(x) Provisional assessment of the income of tramp steamers whose owners do not maintain an agent in India was assumed to be 5% of the freight earnings in India and on this assumed income tax was levied hitherto. Now the percentage will be raised from 5% to 16 2/3%.

(xi) A slight reduction in the excise duty on matches.

(xii) The rate for local letters will be one anna for the first tola instead of two annas as at present, the existing rate of a one anna for every subsequent tola remaining unchanged. The rate for local post cards will be six pies.

(xiii) A reduction of one anna in the basic minimum charge for ordinary telegrams and two annas for express telegrams.

(xiv) Trunk call charges for a three-minute call have been reduced from Rs. 16 to 12 for an ordinary call and from Rs. 32 to 24 for urgent calls.

The various reliefs in taxation were given with the best of intentions, viz., to encourage investment in industry and to afford an incentive to more production which was already falling. But it is doubtful whether there can be any increased industrial activity while the costs of labour and material remain the same.

In the pre-war year 1933-39 total revenues of the pre-partitioned government were Rs. 84.48 lakhs and now they are Rs. 3,38.59 lakhs or about four times as much. Their percentage composition is shown below:—

Revenue

	1938-39 In lakhs of Rupees	Percentage of Total	1950-51 In lakhs of Rupees	Percentage of Total
Customs	40,50	48	1,06,54	32
Excise Duties	8,66	10	71,50	22
Corporation Tax	2,04	2	38,10	12
Income-Tax	13,74	16	80,90	24
Opium	51	1	1,55	—
Other heads	9,15	11	6,96	2
Railways	1,37	2	6,37	2
Posts and Telegraphs	18	—	4,04	1
Debt Services	74	1	1,14	—
Civil Administration	1,05	1	7,86	2
Currency and Mint	58	1	9,52	3
Civil Works	32	—	1,27	—
Miscellaneous	1,58	2	2,73	1
Extraordinary	4,06	5	10	—
Total	84,48	1,00	3,38,59	1,00

It will be seen that both absolute and relative increases have taken place in the receipts under Union Exise Duties, Corporation Tax, Income-Tax, Posts and Telegraphs and Currency and Mint. Customs revenue has no doubt been tripled, but its share in total revenues has decreased by one-third. Falls, both relative and in proportion to the total, have taken place mainly under "Other Heads" and "Extraordinary."

Revenue expenditure in the Budget for 1950-51 shows no less increases over that in the pre-war year 1938-39, under some individual heads and in totals, as shown below:—

	Expenditure 1938-39 In lakhs of rupees	Percentage of Total	1950-51 In lakhs of rupees	Percentage of Total
Direct Demands on revenue	4,24	5	13,81	4
Irrigation	9	—	23	—
Debt Services	14,12	17	36,50	11
Civil Administration	10,90	13	50,06	15
Currency and Mint	36	—	1,76	—
Civil Works	2,52	3	9,97	3
Miscellaneous	3,69	4	38,70	11
Defence Services	46,18	54	1,68,01	50
Contributions and Miscellaneous Adjustments between Union & States	3,06	4	15,41	5
Extraordinary Items	1	—	3,44	1
Total	85,11	1,00	3,37,88	1,00

The remarkable thing about the above statement is that the cost of defence Services has decreased from 54% of the total expenditure in 1938-39 to 50% in the Budget for this year. Remarkable and no less alarming increases have taken place, both absolutely and relatively, in "Civil Administration," "Miscellaneous," and in Grants-in-aid to State Governments. The increase in the cost of Civil Administration has been due to the increasing field of the welfare activities in which the Union Government is taking interest, which have been under the exclusive charge of the State Governments and also due to the increase in size of the Centrally administered areas now known as Part C. States. The increase in "Miscellaneous" is due to the costs of food subsidv and of relief and rehabilitation of displaced persons. The grants-in-aid to State Governments booked here to revenue is different from development grants to States booked to capital. Besides the usual statutory grants in lieu of export duty on jute (Art. 273 of the Constitution) and subvention to weaker States (Art. 275), this year's large increase is due to the scheme of federal financial integration with effect from this year. For some years to come the amount booked under this head is not likely to fall, till the payments to the states concerned for covering the revenue gaps caused by federal financial integration gradually come to an end.

The cost of servicing of the public debt has increased by 2½ times but its share in total expenditure has decreased from 17% to 11%. This dead-weight charge with no corresponding benefit except possibly as a check on the rising price level by increased mopping of the excess of money in circulation through borrowings on a ever larger scale. The increased money in circulation is itself caused by heavier disbursements. This is a vicious circle and unless drastic steps are taken there can be no substantial fall in the cost of annual servicing of the debt, nor in the price level in the country.

The small increase in "Extraordinary Items" is due to two new items of expenditure which were not in existence in pre-war times, viz., expenditure connected with Planning and Development and payment of pre-partition claims.

The phenomenal increase in capital expenditure in the post-war period will be easily seen from the following statements:—

Capital Accounts not met from Revenue:

	1938-39	1950-51
	In lakhs of Rupees	
Railway Capital Outlay	6,44	19,49
Posts and Telegraphs	2,62	5,64
Forest	—	20
Security Printing Press	—	13
Irrigation	—	50
Agricultural Research and Improvement	1	7
Industrial Development	—	9,63
Civil Aviation	—	1,50
Broadcasting	—	60
Ports	1	1,11
Currency	—	2
Mint	—	50
New Delhi Capital Outlay	10	1,76
Multi purpose River Schemes	—	1,60
Civil Works	—	1,09
Road Transport Scheme	—	2
Payment of Commuted Pensions	(—)11	43
Capital Outlay on Sterling Pensions	—	(—)7,37
Payments to Retrenched Personnel	—	(—) 3
Defence Capital Outlay	—	2,15
Schemes of State Trading	—	7,37
Development Grants to States	—	9,59
Total Capital Outlay	9,07	62,00

The total capital expenditure in the Budget for the current year is Rs. 62 crores as against Rs. 9 crores in the pre-war year. We are now operating on as many as twenty-two capital accounts whereas there were only six capital heads in operation in the pre-war year.

Not all capital outlay is productive or financially remunerative. It has been admitted officially that out of Rs. 62 crores provided in the budget for capital outlay this year, Rs. 44 crores represent expenditure on revenue earning departments or on schemes likely to be productive, viz., Railways, Posts and Telegraphs, Forest, Irrigation, Industrial Development, Currency, Security Printing Press, Mint, Multi-purpose River Schemes, Road Transport Schemes and Schemes of State Trading. The balance of Rs. 18 crores is purely unproductive expenditure and should have been met from revenue. But in view of the budgetary position of Government these purely revenue, unproductive outlays are being debited to capital. Had these Rs. 18 crores been debited to revenue, as it should have been correctly done, the anticipated surplus of Rs. 71 lakhs has certainly been understated, and consequently, there would have emerged a deficit of not less than Rs. 17 crores for this year.

Such unproductive expenditure unjustifiably charged to capital are incurred for the following purposes:—Agricultural Research and Improvement, Civil Aviation, Broadcasting, Ports, New Delhi Capital Expenditure, Civil Works, Payments of Commuted value of Pensions, Defence Capital outlay and Grants to State Governments for Development. We do not take objection to the expenditure under these heads, but we take objection to their being charged to capital. Last year's budget provided for a total expenditure of Rs. 95 crores for capital outlay, of which only Rs. 57 crores were assured to be expenditure on revenue earning departments or on schemes likely to be productive. The balance of Rs. 38 crores was actually chargeable to revenue but in view of the budgetary position of government was charged to capital, thereby converting a real deficit into a surplus.

We were assured by the Hon'ble Finance Minister in his Budget Speech that the stage of crisis had passed and

the reduction in the unproductive capital outlay from Rs. 38 crores in 1949-50 to Rs. 18 crores in the current year may have been in his mind when he declared that the financial position has taken a definite turn for the better and that we have turned the corner.

Now with his resignation all these recent assurances of Dr. Matthai need to be re-interpreted. He prophesies a financial crisis very soon, and the demands for excessive funds placed on him have proved too much for him. These demands emanated mostly from Sri M. L. Saxena who has also resigned his post. To avert the crisis, resignations are not helpful. Sri Saxena should have taken the responsibility for finding the money asked for by him, and Dr. Matthai ought to have considered the possibility whether he, if placed in charge of rehabilitation of the displaced persons, would not have himself given his personal assurances for providing shelters for displaced persons. In short they should have exchanged their portfolios to be able to appreciate each other's difficulties.

The position regarding the public debts of the Government is as follows:—

	1938-39	1950 51
	In crores of Rupees	
Rupee Liabilities	737	2499
Sterling Liabilities	469	36
Dollar Liabilities	—	26
Total Interest-bearing Liabilities	1206	2561
Total Productive Assets and Cash	977	1795
Deadweight Liabilities	229	766

While it is gratifying that sterling obligations have been reduced by over Rs. 400 crores in course of these eleven years, there has been on the other hand an alarming growth in Rupee liabilities by over Rs. 1700 crores. While the total liabilities have increased by Rs. 1355 crores from Rs. 1206 to 2561 crores, the increase in interest-yielding assets and cash balances has only been by Rs. 818 crores, as a result of which deadweight unproductive debt has gone by about three times from Rs. 229 to 766 crores.

Consequently, debt servicing now costs one and half times more, i.e. we are now spending Rs. 37 crores for paying interest on the debts as against Rs. 14 crores paid in the pre-war year. These interest payments include discount on Treasury Bills which in the pre-war year amounted to Rs. 69 lakhs and this year they will be Rs. 195 lakhs, or two times more. Government's outstanding Treasury Bills at the end of this year are likely to stand at Rs. 350 crores, whereas their cash balances have since the end of the war never been less than Rs. 150 crores as also at the present moment. At the date of Partition cash balances amounted to over Rs. 300 crores. In pre-war years we managed quite well with balances of a little over Rs. 10 crores at any moment. Then of course our disbursements were about one-fourth of what we are now disbursing. Maintaining cash in hand of Rs. 40 to 50 crores would have now been more than sufficient. Instead we are now having Rs. 150 crores. Maintaining idle cash far in excess of our requirements is wasteful, the extent of the waste is measured by the interest which we could have avoided paying on our Treasury Bills. Adding to cash balances unnecessarily by borrowing has been most unwise, to say the least.

The disorder in our departments is indicated by the fact that the accounts for years 1947-48 (pre-partition and post-partition) and 1948-49 have not yet been closed, and we do not know when these are likely to be closed and audit Reports thereon see the light of the day.

—Adult Education in Independent India

By Dr. K. N. KINI, M.A., PH.D. (*Columbia University*)
Late Director of Public Instruction, Jodhpur.

INDIA is a young republic. Its constitution is democratic, based on adult franchise. No democracy can function truly if its voters are illiterate, not to speak of their being uneducated. Only about fifteen per cent. of our population are literate, that is, are able just to read and write. If we consider only the adult population, the percentage of literacy is much less than fifteen; and the truly educated, that is, the proportion of adult population who can read a newspaper and understand the meaning of what is read is still less. Under these conditions, will the vast horde of illiterate and uneducated adults vote intelligently, knowing their civic rights and responsibilitiees and knowing what and why of their voting? Those who have conducted voting operations know how easy it is to mislead the ignorant voters. The harm is not great or vital, if the voting is in connection with minor elections. But when voting is effected in connection with the election of members of parliament and legislative bodies of an independent country and its constituent States, the ignorance of voters may spell disaster to the nation. The unscrupulous and dishonest candidates may work surreptitiously on the minds of uninformed adults and secure seats on these vital bodies and use their power for selfish ends and thus ruin national ends. It is therefore of paramount interest and importance that the whole mass of illiterate adults should be made literate in as short a time as possible.

What is the time by which we can make the whole of our adult population literate? Even if we think that 85 per cent. of the adults are illiterate, how many years shall we require to render them literate? Some people think that we can achieve this in fifteen years. Yes, we can, if sufficient funds may be made available to work out the programme. But if one views the ways in which our Central and State Governments Vote Funds for education and then effect cuts in the name of economy, one does not feel bold to say that we shall be able to make the remaining eighty-five per cent. literate in fifteen years. Russia, with all her totalarian methods and successive five year plans, was able to raise the percentage of literacy from 25 in 1919 to 80 in 1939, that is she could increase the percentage of literacy by 2.75 per cent. per year on an average. Even computing by the Russian standard for which there is not the least warrant, we shall require not less than 30 years to make our whole population literate. Less earnest as we are, we may take even a hundred years. The nation should ponder seriously over this momentous question and ensure that our democracy does not founder.

NEED FOR UP GRADING

The adults to whom literacy has been once imparted should maintain it throughout their life and improve upon it. Their interests should be catered for through reading material and then the permanency of their literacy will be secured. They should be drilled for a month or two in the art of reading and understanding newspapers and magazines as a regular part of adult education scheme. Books dealing with their particular vocations in life should also be availed of in their training. Every adult wishes to upgrade himself not only in general educa-

tion but also in his particular vocation. *Adult education should be vocationalised,* not only in the interests of the adults but also in the interests of the advancement of industry, agriculture, transport and production of defence materials for the army, navy and air-force. The future workers should be as highly educated as possible, both in general civic and vocational pursuits. Their intelligence should be quickened and their knowledge of science, mathematics and drawing as applied to their particular vocations should be as high as possible. Our backwardness in modern technological industry and agriculture is in the main due to the extreme ignorance of workers in these matters. Adult education should rectify this defect and should secure a higher vocational competency of our workers.

For those adults who are already engaged in industry *trade extension* courses should be organised. An adult who has not been very efficient in his present vocation, say plumbing, wishes to up-grade himself in it. He should find opportunities for undergoing higher training in plumbing with its related art, science and mathematics. Similarly "trade-preparatory" courses should be organised for those who wish to enter upon newer vocations. An adult has been in the moulding section but suppose he finds little prospects in the line at his place. He wishes to be a turner. The vocational department of adult education should be in a position to give him training in "turning" and thus up-grade him in earning. When adults find that their vocational competency will be enhanced, they will run to adult education centres.

RURAL UNIVERSITIES IN ADULT EDUCATION

In our programmes, especially of higher adult education, we often forget the needs of the rural population who form eighty-five per cent. of the total population of our country. While evening courses are being organised in urban areas, both in the literary and vocational subjects, rural areas are not covered by any of such programmes. We talk of "grow more food" but in how many villages have courses in agriculture on modern lines been established? Selection of seed, using suitable manure, proper mode of cultivation, removal of weeds irrigation, stemming the tide of erosion of soil, conservation of water and soil etc., are important matters on which the efficiency of our farmers depends; but no *systematic attempts have been made in* imparting modern scientific and technological knowledge in these topics to the rural folk. One of the main causes of this laps is that there are no institutions of higher learning in rural areas where the intelligentia of those parts can be brought to receive this knowledge. The intelligent folk of villages migrate to the towns and thus the villages are rendered intellectually sterile.

I strongly urge the establishment of *rural colleges and rural Universities* which will cater to the social and economic needs of the rural population and to which rural children who have passed a suitable matriculation examination will be admitted. Agriculture, animal husbandry poultry-farming, sheeprearing, fisheries, forestry, pottery, textiles, building trades, rural electrification, rural road-making, various types of small scale industries etc., will be the core subjects round which related language, science, mathematics, art and drawing and occupational civics could be built up. The cultural equipment of the rural folk will thus be closely co-ordinated with their life occupations and thus their interest in both spheres will be enhanced and emphasised. The standard of instruction will be of the

college level and the rural people will be afforded facilities for prosecuting their studies to the highest stages including research in these subjects.

It is an irony of our times that laboratories for study of rural subjects like agriculture, animal husbandry, fisheries, forest-products and beekeeping have been set up in urban parts where there is no natural environment for their studies. It is doubtful if their organisers were at all serious and earnest about their tasks. Time has come when these institutions should be shifted to rural areas and associated with rural colleges and rural Universities when alone they will be in their natural setting and where the needs of the rural population could be envisaged directly.

In these rural colleges and rural Universities arrangements can be made for the education of rural adults both in the cultural and vocational fields in their own enviroment and at times suited to their leisure hours. When agricultural work is slack, the farmers could have instruction during the day: and when that work is heavy, there may be cessation of instruction or work in night classes just as it may suit their convenience. *Trade extension* and *trade* preparatory courses can be organised in these institutions of higher earning at any desired level.

BUILDING A NEW PHILOSOPHY OF LIFE

On account of age-long ignorance, isolation and superstition, our rural folk have become lazy and devoid of aspiration to improve their living condition. Totalism, disease and poverty are rampant among them. The old slogan "simple living and high thinking" has deteriorated in practice into sorrowful existence. With this kind of life of the major portion of our people, it is doubtful if we will be able to maintain our independence. In our adult education-classes we must adopt and propagate a new slogan, namely. *High living and high thinking* which are not incompatible with each other but which go most well in this materialistic world.

In rate of production of utility goods, we are most backward. Production should be speeded up. "Slow and steady" does not win the race in this competitive world. "Quick and sure" wins the race to-day. "Hasten slowly" is another myth to which we have become accustomed and which has been not a little responsible for our lazy habits. We must teach our people to "Hasten Hastily". At our present rate of progress we shall take centuries to come abreast of the materially more advanced nations, assuming that we shall be vouchsafed independent existence by the more powerful nations.

Defence should be our earnest and immediate concern. The race in military conscription and armaments among the greater powers shows that non-violence has no place in this world. As long as human beings have the instincts of pugnacity and possession, wars will take place as they have taken place all along in history. As practical men in this grabbing world, we should adopt the slogan *"Every adult be a soldier"* and work up to this end through our adult education programmes.

—INDUSTRIAL PLANNING

By LALA LAKSHMIPAT SINGHANIA

THE performance of the industry in spite of various handicaps is not altogether bad. The fiscal policy so long pursued has not been appropriate to meet the requirements of industrial development of an under-developed country like India. Yet industries like iron and steel. cotton textiles, sugar, paper, magnesium chloride, sericulture, gold and silver thread, artificial silk and cotton, have made some progress in spite of the halting nature of protection received from the Government.

Production trends in 1949 are not disappointing. There has been an upward trend in respect of certain important items such as steel, cement, coal, aluminium, electric motors, transformers and lamps, bicycles, caustic soda, paper, etc. In certain other industries such as motor car batteries, insulators, bare copper conductors, asbestos sheets, cigarettes, matches, leather, footwear and woollen manufactures, production has been maintained at more or less the level of the previous year. Production of textiles, salts, soda ash, soap, plywood, abrasives, centrifugal pumps, electric fans, machine tools, lead and antimony, however, has fallen below the 1948 level.

But the output of industry falls far short of our requirements and it will be the duty of the Planning Commission to make a fresh blue-print in the light of India's immediate and future requirements and to decide what portion of the needed capital is to be invited from abroad and how to raise the remaining amount from within. From a press report it is learnt that negotiations for foreign participation in Indian industrial projects have been finalised in regard to 75 projects between August 15, 1947, and the end of 1949, involving a total foreign investment of 213 million dollars. Thirty-eight of these projects relate to the manufacture of consumer goods, representing 26 per cent. of this foreign investment. It is also learnt that 32 of these projects with a capital investment of Rs. 8 crores are under State auspices and 43, with a capital of Rs. 21.9 crores are organised by private enterprise mostly for manufacturing consumer goods. The Government should discuss the details of these projects with Indian business experts to be sure that these are really useful and economic propositions. Secondly, their implications in relation to the existing Indian industries have to be fully examined. I am constrained to observe that the industrial projects, so far launched by the Central as well as the State Governments do not seem to be worth the money spent as also do not augur a bright future for State ventures. I am not, however, afraid of foreign capital but would rather welcome it and I agree with the Finance Minister of India that "Any considerable assistance in the way of capital from foreign countries must hereafter be looked for, not in the shape of fixed interest bearing loans and bonds, but in the shape of equity capital on the basis of joint participation on strict business considerations without any political strings attached to it." I am glad that the Government have realised by now that suitable conditions must be created to invite foreign capital to this country and I am sure that Indian capital will also be forthcoming under these circumstances.

The situation in India is not so desperate as to justify an experiment in state trading which, except in a totalitarian country, can be thought of only as

an emergency measure. The technique of state trading which developed under the inspiration of Dr. Schacht in the Nazi Regime before the war and which was resorted to in some countries during the last war in the matter of reciprocal bulk purchase agreement has outlived its utility, particularly in a country like India, which has not much of the bargaining power. From all accounts, state trading undertaken in India in respect of foodgrains, steel, fertilisers, etc. has not proved to be an economic proposition. Besides, there are obvious difficulties for the State to provide adequate finance, whereas there is urgent need for more employment of the private finance in the trade and other enterprise. It cannot be denied that state trading will further choke the normal channels of trade and will throw quite a big number of middle-class people out of their occupation.

It is often said that most of the people of this country, at present, have no incentive to give of their best for our economic uplift. Self-interest is admittedly a great motive of economic activity, but it is not the only motive. Economic man's self interest is to be enlisted in support of the needs of the community. In a free country, the principal role of the Government is to create conditions for voluntary co-operation, harnessing the energies of every section of people and direct them towards the betterment of the community as a whole.

The business community in India has been called upon to assist the Government in running state enterprises and to exercise influence by solid and persuasive reasoning directed to national advantage. I am confident that businessmen all over the country will place their services at the disposal of the Government provided the right kind of incentive is created. As our Prime Minister said the other day, while addressing the meeting of the Federation of Indian Chambers of Commerce and Industry, that the masses must get the sensation of being partners in a large enterprise, the trade and industry also feel that they could give of their best in the task of economic recovery of the country, if their active co-operation was sought for. The task of working out some of the development projects of the State can be entrusted to Statutory Corporations consisting of experts and businessmen with experience as is being done in other propressive democratic countries, where indications are available through ballot boxes that people do not like regimentation of trade and industry. I do not suggest an immediate bonfire of controls, but private trade can be utilised for implementing control measure, consistent with a policy of progressive withdrawal of control. For instance, private trade may be asked to perform all the work from procurement to distribution of foodgrains under the rationing scheme at competitive rates and I am confident that it will no only save a considerable amount of public funds but will also progressively rehabilitate lakhs of traders, mostly of the middle-class, who have been thrown out of their occupation they had been in for generations.

I would take this opportunity to stress the need for running the existing and proposed state enterprises according to the accepted principles of commercial costing, as is done by private concerns. State managed public utility services like the Telephones, Bus Service, Electric Supply, even the Railways and Post & Telegraphs, particularly those concerns which are of monopolistic character require a stricter degree of public control and should be accountable to the public, who are, after all, the equity sharehol-

ders of these business undertakings. From all accounts, state managed undertakings, due to the element of irresponsibility, lack economy in expenditure and efficiency in management from a commercial point of view. The system of accounting in the State Railways has been sharply criticised by the Railway Enquiry Committee. A similar enquiry into the working of other State enterprises will reveal, I am sure, a huge avoidable waste. The consumers also have been asked to pay more for most of these services, since the State took over the management. For instance, the rates of electric supply at Kanpur have been increased by 64% after the U.P. Government took over the Kanpur Electric Supply Company, and since the nationalisation of the bus services in the State, the rates have gone up by over 50%. The right solution to the problem of combining the best points of private enterprise with a stricter public control is constitution of Statutory Corporations with representatives of the Government, the consumers and businessmen.

The above is taken from a speech delivered recently by the writer before the Bharat Chamber of Commerce, Calcltta.

—SILK AND SILK INDUSTRY

By Sri BENODE BEHARI THAKUR of the Government Silk Conditioning House, Calcutta.

SILK is an article of popular demand and is an item of use in every home. Silk or natural silk is a produce of glossy thread obtained from spinnerettes of insects known as "Cocoons." Though there are several varieties or species of worms that produce silk, such as Tasar, Muga, Eri, etc., silk or natural silk is generally taken to refer to the Mulberry silk industry.

All the varieties of worms pass through the same cycle of metamorphosis and feed on different varieties of food plants and leaves. Silk or mulberry silk is grown from cultivated mulberry and reared indoors. Eri (endi) is also reared indoors and fed with Castor plants. Tasar and Muga are grown on trees in the open and in the forests.

The worms are susceptible to various diseases, epidemic and hereditary on which success of a crop depends.

The full grown worms develop silk glands from which the filament is exuded and solidified in contact with air. They enclose themselves within the layers of the filaments beginning from outside and ending in within. These layers of filaments forming into individual shells of cocoons are used for reeling out silk thread. There are different varieties of cocoons, White, Yellow, Green, etc.

For reproductive purposes, healthy cocoons are carefully preserved. Moths or butterflies cut upon the cocoons. After copulation, the isolated female lay eggs numbering each from 250 to 400. These moths are examined microscopically for their disease.

IMPORTANCE OF THE INDUSTRY

At a time when Europe, the birth place of industralisations, was inhabited by uncivilised tribes, India was famous for her artistic products. To mention but a few of the legion of the artistic products such as cotton goods, muslins, silk and silk brocades, in the world's market, India's silk was always testified for its high excellence and cheapness in the past. India was known to be the home of silk though not the source of origin. India's silk enjoyed its zenith in the world's silk market in the past.

The area in which sericulture is carried on is Kashmere, Mysore, Bengal and part of Madras for Mulberry, Assam, Behar, Orissa, Central Province, Hyderabad (Deccan) respectively for Muga, Eri and Tasar silk.

The industry is of so much importance that the exports in the year 1796 was at the figure of 6,56,000 lbs. while the contemporary share of total exports from Italy, France and other countries amounted to 2,82,304 lbs. only. In 1830, some 12,00,000 lbs. of silk were exported to England, besides the quantities borne on ordinary traffic. The exports constituted only the silk produced in Bengal. While, Pehrine, a silk worm epidemic broke out in Europe, Bengal raised her exports to a figure of 15,58,246 lbs. in 1866-70.

Recent annual imports and exports of silk piece-goods are as illustrated below:—

Imports

Year	Silk raw Quantity in lakhs of lbs.	Silk raw and all silk manufactures Value in lakhs of Rs.
Pre-1st war		394.5
Post-do-		573.9
1937-38	22.68	90.0
1939-40	20.20	54.3
1942-43	0.20	0.12
1943-44	0.10	0.13
1944-45	0.10	0.05
1945-46		5 00

Exports

Year	Silk raw Quantity in lakhs of lbs.	Tasar and other wild waste Quantity in lakhs of lbs.	Value of all silk Value in lakhs of Rs.
Pre 1st war	—	—	58.00
Post-do-			65.80
1937-38	4.6		29.30
1939-40	4 5		22.80
1942-43	3.3	3.4	23.10
1943-44	1.8	.9	9.10
1944-45	1.5	1.4	8.10
1945-46	2.95	1.15	7.60

A portion of the figures relating to ex ports enormously constitute the goods which are re-exported or passes in such trade processes. Japan contributed a good share in import till Nemesis of War set and a spate of speculative activity came into being in the market. Imports and exports in war time included mostly Defence services products. U. K. and allies supplied materials, during this period. Quantitative share of the Indian exported goods during pre-2nd War, however consisted of her own manufacture in whatever less quantities they were supplied.

Exported goods also constitute, as shown in the Table, a good share of Waste silk and Tasar Waste etc. which are exported at nominal rates to foreign countries for manufacture of spun silk. The relative value attached to the Waste speaks for the price it fetches.

* The position of the Industry was far brighter till 1900, but during the last few decades, it reached the verge of complete extinction.

SCOPE OF REVIVAL

India could still make headway with the improvement of the industry in order to regain its old reputation, even in part, though not *fully*.

Japan was able to have an enormous development of the silk industry within the last thirty-five years, when she became the Raw-silk supplier to the world's market to the extent of 80% from a very negligible percentage of less than 20% in the past. Japan alone exported as much quantity as 75,000,000 pounds of raw silk in the year 1937-38.

Indian silk, still, to-day, but for its price even with all its defective systems, finds favour abroad. The Government Trade Commissioner in Toronto during 1946 described Indian silk brocades were also well received, and although superior in quality to any other brocades ever seen in the market could not satisfy the customers in as much as it cost 75,00 cents per yd. against 25,00 cents per yd. of Chinese brocades of much inferior quality. The Indian exported goods constitute about 16% in silk, and such goods with such other embellished patterns can be adapted for use in one form or other into the patterns of Canadian use.

Utility and cost of production of Indian silk goods therefore stand as the main criterion for its markets. Every commodity in some form or other has certain benefits and factors to command and influence on its localised production and a *Commercial holding* attached to it which can keep it alive for some time more against complete extinction. It is perhaps that the Indian silk goods are still enjoying the benefit of Commercial holding to a certain degree in home and foreign markets, more profitably than the benefits derived from the Tariff protection and other privileges. One who prefers to buy Indian silk will no doubt like to have

it till his pocket affords to do so. *But such consideration may not encourage the industry to foster on commercial grounds and the industry has to establish its economic importance on its own merits.*

CONDITIONS IN ADVANCED COUNTRIES

The whole thing in Japan is well-organised on a sound and scientific basis. They have rationalised the Industry in all its stages. Their contributions by way of researches on special problems to standardise and produce uniform quality of silk at a remunerative price, and the Government initiative have all helped the industry to make such a headway. Improvement of species of worms and mulberries has resulted in greater yield in the silk cocoon filament and quality of silk content as also the cheap cost of production. It will be interesting to note that Japan, formerly used to raise only one crop in spring. She is now raising three to four crops in a year of such cocoons of Univoltine (one-brooded) types between Spring and Autumn by way of artificial hatching with other conditions being made suitable. We raise three to four crops with one Univoltine also. The Indian silk rearers are perhaps yet in old bullock-cart days as to thinks of rearing by artificial hatching.

OTHER FACTORS

Silk raising is an essential factor and part of sericulture, and as such fundamentally affects the price factor. The failure of cocoons is caused by various diseases. Serious efforts have been made by Japan to combat and eradicate the diseases by distribution of seeds which are disease-free with strict control by Special laws and ordinances. Though the old past records as recorded by Mr. Lefroy in Vol. 1 of the Report on the Enquiry into the Indian Silk Industry did not put forth a promising ground which reads as "that even after years of Nursery selections, and of rearing carried on, regardless of expenses, disease-free seeds do not exist," one has no doubt to be optimistic to anticipate good result by better methods of development. Mr. Lefroy's report was also published only a decade and odd years of working of the establishments of sericulture.

Reeling of standard uniform quality silk on competitive price plays no less important part in the Trade. The cocoons for storage are not dried by the Japanese rearers. It is also a branch within the scope of educating the people regarding the importance of raw-silk properties in cocoons. The length of the thread from the boiling cocoons for reeling, the temperature of the reeling basin and nature of water used in the reeling have no less an important bearing on the quality of raw-silk. The filament length of average good "Jomayu" cocoons of Japan is about 1300 yards or more i.e. 2 to 4 times of the Bengal average cocoons. All these ultimately count much to the cost of raw-silk. Crude methods of our primitive reeling processes do not seem to have taken better outlook, even after some of our reelers were worked on better methods.

Only one reeler girl works on twenty to forty reels at the maximum on each basin (reeling pan) on a Japanese automatic multiple thread reeling machine and turn about two and a quarter pounds of raw-silk of finer size (13/15 denier) with an earning of -/13/ (thirteen annas) only at pre-war par, or half a yen. These machines replaced the French and Italian ones, formerly used in Japan. The reeling Index increased from 100 in 1900 to 682 in 1936. There are at present about 300 Reeling factories in Japan. Spindles working for spun silk mills amount to 24,000 and number of silk weaving looms is 33,200 out of the total number of looms

numbering 71,160 of which 36,600 on cotton.

Even after the havoc wrought by War, Japan exports as much as 20,000,000 lbs. of raw silk, that is 85% of Japan's produce.

STANDARDISATION

Silk is classified in ten grades *AAA (Special), AAA, AA, A,B,C,D,E,F and G. 85% of Japan's produce in raw silk is exported and 15 per cent. is utilised for home requirements and in other manufacture of fabrics. The grades are estimated and tabulated according to the composite qualities of the raw silk for Winding tests, size, size-deviation, evenness, Clealiness, Neatness and also Cohesion (agglutination or stickiness) and strength with elasticity and elongation over the normal strength.

All silk examined and graded with determination of correct conditioned weight on an allowance of 11% over absolute Dry weight, are conducted through the two important Silk Conditioning house situate at Yekohama and Kobe, and then passed for exports. These institutions with other auxiliary establishments conduct research works in various branches, on the quality of raw-silk.

The twenty-two nation World Silk Conference which met at Zurich, Switzerland in 1949, has accepted and formally established an International Silk Association with new standards assimilated with the Standards followed in United States and Japan. Radically Indian interests may also have to tune up, with the World-standards for her imports or exports in silk.

RESEARCH EXPERIMENTS, PUBLICATION

The Sericultural University and the Imperial Sericultural Research Institute, with a co-ordinated adminstration of the Department of Agriculture, Forestry, Commerce and Industry conduct research work, in co-ordination with fifty other sub-stations. The Research Institutes keep a direct control on the Reproductive lots of worms.

A large number of books on Sericulture in Japanese language are published. Monthly magazines are published from various centres and useful bulletins are also published. Indian publication on sericulture are limited and some bulletins which have been published are sometimes stereotyped. A few reports of market rates of sericultural products are now in circulation in the sericultural provinces of the country. A regular continuance of the publication of worthknowing results would be welcome.

Sericulture- Guilds- Prefectures:—For improving, developing and controlling of raw-silk industry several organisations for co-ordinated work exist, in Japan.

Sericulture Education:—Japan developed her silk industry with education of the workers and industrialists with careful selection in the syllabuses in the subjects of:—Ethics, Gymnastics, Mathematics, Zoology, Economic Entomology, Botany, Physics, Chemistry, Meteorology, Bio-Chemistry, Mori or Mulberry culture, Genetics, Silkworms-anatomy-pathology and micro-biology, Filature, Management of Agriculture and sericulture and their lass, Pedagogics, Textile fibres and weaving Bio-physics, Colloid Chemistry, Economics and Economic organisations, Chemistry of Dyes Engines, Factory-Filature working and cocoons storage, Silk testing and grading, Silk spinning, Accountancy and book keeping Industrial Policy and statistics, Refrigeration and Grainages.

The processes so conducted are selected carefully such as all accentuates into

the important part of the economic structure of Silk Industry.

CONDITIONS IN INDIA

Mysore and Bengal are the two important provinces for silk. Kashmere follows a State-monopoly system and accrues about crore rupees of Revenue.

In Bengal in 1910, the districts of Malda, Murshidabad, Rajshahi and Birbhum used to produce about ten lakh maunds of cocoons and had an acreage of 131,000 under Mulberry cultivation. In 1938, the acreage fell down to 9,500 acres from 25,000 acres existing in 1932-33, vide Tariff Reports. The industry enjoyed 60% advalorem duty on imported silk goods which is now further revised to an advalorem of 30% over specific of Rs. 15/12/- and lately the specific duty being reduced to Rs. 6/- in place Rs. 15-12.

India consumes about 40,00,000 lbs. of raw silk besides the imported silk piece-goods and produces half of it. Mysore produces an estimated quantity of 14,00,-000 lbs. of Rawsilk (Charkha and Filature). The State raised here expenses from Rs. 2,46,000 in 1938-39 to about Rs. 700,000 in 1948, with an acreage of 30,000 raised to about 75,000. West Bengal has a population of 130,000 dependant on mulberry cultivation and silkworm rearing, spread over 1000 villages with total population benefited 320,000. She expends about Rs. 250,000 with developmental projects etc. amounting to Rs. 400,000 approximately. As a contrast it may be cited here that Japan now holds about 1,000,000 families with 5,000,000 people engaged producing about 150,000,000 pounds of cocoons of which 90% are good "Jomayu" cocoons. Japan used to spend about four crores of Rupees, at pre-war par-exchange.

Mysore has co-ordinated some of her activities with the organisation of the establishments and subsidising with (1) Aided Grainages (2) Bonus for mulberry topes (3) Sericulture loans (4) Correspondents abroad to collect useful data of modern developments (5) Organisation of cocoons markets (6) Formation of silk Reeling and Weaving Organisations in collaboration with the Mysore Association and (7) Sericultural education on scientific lines for sericulturists and Departmental employees.

The activities of the Sericultural establishments in Bengal consist of (a) Seed Production (b) Subsidies selected rearer as Aided grainages (3) Seed examination Organisations (4) Silk Reeling and Weaving Organisations on Co-operative basis (5) Formation of Silk Associations for the welfare of the Industry (6) Gradation of silk and its standardisation through a Silk Conditioning House in Calcutta, in order to assimilate the production to a standard followed and accepted by international standards.

CONCLUSION

War gave us a chance to develop the industry. During War, Government fixed prices for certain standards of silk and brought under control the production of silk, for the first time as was necessary for Defence services. Imports being closed, the acreage of mulberry increased by 2 to 3 times and the price of silk went up by 6 to 7 times. The present rate of silk is about Rs. 35/- per lb. due partly to the increased cost of production and partly to speculative conditions. An adjustment of prices between the producers and and consumers should receive priority consideration in all quarters and any influx of cheaper silk may hit the industry. Present conditions offer a promising back-ground for the establishment of economic units in the development of the

Indian silk industry, save for the difficulties which may have to be met in securing efficient appliances and instruments of standard working.

WASTE UTILISATION AND MANIFOLD SCOPE FOR SILK:

Mysore has a Spun silk mill. A quantity of Waste more or less equal to the total silk is obtained during reeling. Utilisation of such wastes containing about 75% of silk content, which are generally exported to foreign at nominal rates say Re. 1/4/- per lb. after they are cleaned here, would no doubt pay the industry in lower cost of production. In *Japan nothing is lost of the silk Industry.* The leaves are fed to the worms and stalks are used for paper-pulp making. Carbon is produced from wastes of silk worms. Fine pupae oil is produced from the pupae inside the cocoons. This oil when refined, is used as sauce, and for manufacture of soaps. Amino-glyseric acid is produced from the Bericine available in Reeling water by treatment with Sulphuric acid. After a further process of nitration, deadliest explosives can be manufactured. Silk is also used as a substitute for quarter fibre. Silk and silk components also play an important role in the sinews of War. The experience of 1st. war was availed of by other countries. India, though late had to share such War service during last war by processing and manufacture of some silk components and parachute cloths, with foreign and Indian raw silk, all being tested through the Bengal Silk Conditioning House which served as a media for gradation of raw-silk.

Art-silk Controversy:—There was a common controversy as regards competition of Art, silk with silk. It is established by all advanced countries that these two are very little complaisant of each other. India imported annually on an average 2,52,0000 lbs. of raw-silk during the period ending 1913-14 and 2,535000 pounds in 1937-38, which show that Art silk does not materially affect Natural silk industry. Art silk Industry has however its own potentiality.

There will thus be still scope for the Indian silk industry to revive by the establishment of economic units and with co-ordination of methods, instruments and workers and their synchronising with those of Japan. It has been advocated by experts that the European methods are less useful for us and that of Japan being analogous with the Indian conditions are congenial.

The ultimate object is however to produce Standard Raw-silk at as low cost as possible by exploring all advantageous methods and utility of bye-products and development of auxiliary industries or their suitable use in better Silk, Tasar, etc. A review shows that Far East in the long past turned out 20 to 75 lbs. of raw-silk per acre with 1600 to 4000 Shrubs in 2-3 crops as that produced in India was at 30-62 lbs. Silk from 1600-2800 shrubs per acre in 1-4-crops (Cansdale).

Integral foundation of our developmental projects would no doubt be the scope of selection of such steps, which may not turn to be an eye-wash or Window-dressing in future—Past records may not always act pessimistic and we may and should avail of the best opportunities in such a way as every aspect thereof may fabricate its own construction interlacing the aid of suitable and proper training of the workers in the Industry and the Commercial producers.

The good senses of our people may hence no doubt make an impression and take an optimistic view in improvement of the Industry from the Illustrations given.

—MANUFACTURE OF LIQUID GOLD

LIQUID gold is an important article extensively used in the decoration of glass bangles and ceramic wares. Its annual consumption in this country is rather high and is still daily increasing with the expansion of pottery and glass bangle industry. At the present time the major portion of liquid gold is imported from foreign countries; therefore, the necessity for manufacturing this indispensable decorating material is apparent. With this object in view we are dealing in detail about its manufacture as far as practicable.

In liquid gold, the gold and other necessary metals are present in the form of resinates, which can be prepared either by interaction between the metallic chloride and the balsam of sulphur or the turpentine compound or by heating together oxide of the metal with the venice turpentine at the boiling point of the latter. The exact nature of this prepara tion is not well understood. It is believed that gold is converted into a gold-turpen-sulphide which readily dissolves in essential oils. As gold has a high melting point, it is necessary to use small proportions of bismuth, ceranium or tin, with it so that gold softens at a lower temperature and adheres better to the ware after the muffle fire. Gold is a soft metal. So the gold decoration will wear out sooner unless it is hardened by the addition of small proportion of some other metals. Hence the addition of these minor constituents, such as, bismuth, chromium and rhodium resinates is necessary. They have an important bearing on the physical properties of liquid gold. That function of bismuth resinate, which forms bismuth oxide on burning, is to fasten the gold film to the glass or porcelain surface to which it is applied. Chromium resinate present in liquid gold plays a role probably similar to that of bismuth resinate. The main function of rhodium resinate is, however, to make the film of metallic gold lustrous.

Brief description of the methods of preparation of each of the constituents of liquid gold will first be dealt with before the final compounding of the product is discussed.

BALSAM OF SULPHUR

The chief factor in obtaining a quick drying bright gold is the use of a preparation known as balsam of sulphur. This substance may be prepared in various ways, one of them, giving good results, being as follows:—

16 parts of venice turpentine and 80 parts of rectified oil of turpentine are placed in a carefully warmed porcelain dish (a gas flame being preferably used), and heated with care until a homogeneous liquid is obtained. 16 parts of finely powdered sulphur are then stirred in, the stirring and warming being maintained until the whole is dissolved.

The process is facilitated by the gradual addition of 50 parts of oil of spike lavender.

GOLD RESINATE

To prepare gold resinate, metallic gold as available may be rolled and beaten into thin sheets and then cut into small pieces to accelerate its solution in aqua regia.

The solvent used must be a liquid that disengages free chlorine, this being the only way in which gold can be dissolved. Nitro-hydrochloric acid or aqua regia consisting of 1 volume of nitric acid and 3 of hydrochloric acid, is invariably used. 20 tolas (233.3 grms.) of gold are dissolved in 1400 c.c. of aqua regia in porcelain dish.

When all the gold is dissolved a small quantity of fine gray powder may sometimes be observed at the bottom. This consists of silver chloride, and is a sign that the gold contained silver, which is removed by filtration. The gold chloride so obtained is next treated with 150 grams of potassium chloride dissolved in about 300 c.c. of distilled water. The whole mixture is then evaporated to dryness on a water bath. The orange yellow crystals of potassium-auric chloride as formed should then be dissolved in about 2 kilogrammes of pure methyl alcohol and filtered to remove the unreacted potassium chloride. This solution is then ready for the preparation of gold resinate.

1 kilogramme of the sulphur-balsam is added slowly to the solution potassium-gold chloride, the rate of admixture being so adjusted as to avoid an excessive rise in temperature. Now the methyl alcohol is evaporated off leaving behind the thick mixture of gold resinate and unreacted sulphur balsam. This mixture is then dissolved in 100 grms. of pure choloform and the solution neutralised with about 150 grms. of pure sodium carbonate, added gradually till the reaction becomes faintly alkaline to litmus. To ensure complete neutralisation, the contents should then be left for about 24 hours and the solution tested once again for acidity with litmus paper. More sodium carbonate should be added if it is still found to be acidic.

The chloroform solution is next filtered to remove the potassium chloride, excess of sodium carbonate and any gold metal which might have been formed during the reaction. The filtrate thus obtained is gold resinate.

In order to obtain pure dry gold resinate, the filtered chloroform solution is added drop by drop to methyl alcohol which is kept continually stirred, and in this way the gold resinate is precipitated. The precipitated resinate is filtered and washed thoroughly with methyl alcohol, after which it is dried by spreading the filter paper at room temperature, and the dried resinate finally powdered and kept in a well-stoppered bottle.

Great care must be taken in the preparation of the gold resinate, as otherwise the liquid gold made from it will be deteriorated after storing for even a few days. The deterioration is most probably caused by the presence of minute traces of impurities which remain adsorbed in the gold resinate during preparation. The precautionary measures that need to be taken to avoid such decomposition are, firstly, prevention of dust from the atmosphere from coming into contact with the chloroform solution of the gold resinate, and, gradually, washing of the precipitated resinate very thoroughly with methyl alcohol before drying.

GOLD GLANCE

Take the sulphur balsam in a large porcelain basin and add to it with constant stirring sufficient gold chloride solution to give 45 per cent. gold content. The gold solution should be sufficiently diluted. Warming of the mass may be necessary for vigorous stirring. Leave it for 24 hours to complete the reactions.

Decant off the liquid collected on the top of the black mass and wash it with hot water five or six times till the wash water is free from hydrochloric acid. Collect the wash water as it contains some gold solution. Remove all moisture from the dark mass by rubbing with a pestle and warming occasionally when it is ready for mixing with the other ingredients.

Mix all the ingredients of liquid gold with the gold glance prepared as above and shake well preferably in a mechanical shaker, for several hours. Then keep the solution in a well corked bottle.

BISMUTH RESINATE

In Bulletin No. 16 of the Industrial Research Bureau the following process has been described:—

100 gms. of the bismuth nitrate are dissolved in 200 c.c. of water containing 20 c.c. of concentrated nitric acid, and the solution then heated on a water-bath. To this solution is next added 90 gms. of pure potassium hydroxide dissolved in 100 c.c. of hot water. An orange yellow precipitate of bismuth oxide is produced thereby, and this should be washed free from alkali and dried in an air-oven at about 70°C.

To prepare the bismuth resinate, 50 gms. of the dry bismuth oxide are mixed with 150 gms. of fresh Venetian turpentine and the mixture heated on a sandbath for forty-five minutes, the temperature being carefully controlled so as not to exceed 160°C. The mixture is then dissolved in about 100 c.c. of chloroform, thoroughly shaken, and filtered to separate the unreacted bismuth oxide. The bismuth resinate is precipitated from the chloroform solution by adding it drop by drop to 400 c.c. of methyl alcohol which is continually stirred. The resinate is finally filtered, dried at room temperature, powdered and stored in a stoppered bottle.

This resinate is also obtained by melting 1000 parts of pale resin (colophony) and mixing with this 300 parts of basic bismuth nitrate. When the effervescence has subsided and the mass is quiescent, 1500 parts of Lavender oil (or a mixture of this and nitro benzol) are gradually added, and the liquid is left for any insoluble matter to settle down. The lavender oil may be replaced by rosemary oil, or by a mixture of lavender oil, rosemary oil and oil of turpentine.

CHROMIUM RESINATE

To prepare chromium resinate first of all a resin soap may be prepared. For this purpose 500 parts of powdered pure resin are heated with 300 parts of caustic soda lye (2 parts of water to 1 of caustic soda). The mixture is stirred continually until all the resin has dissolved, a yellow mass being obtained on cooling. This is broken into small pieces and washed for a short time with water, which turns brown and is poured away. The finished soap is then dried and used in the preparation of chromium resinate, as per formula stated below:

Resin Soap	1000	parts.
Water	2000	,,
Chrome alum	500	,,
Mix.		

To make the standard chromium resinate solution dissolve the chromium resinate 1000 parts in rosemary oil 3000 parts.

Another process of making chromium resinate as described in the Bulletin No. 16 of the Industrial Research Bureau is as follows:—

The starting material for the preparation of this substance is chromic acid, 5 gms. of which should be dissolved in 10 c.c. of water in a porcelain dish, and to this should be added 16 gms. of the sulphur-turpentine compound, the mixture being stirred continually. A considerable rise of temperature will be found to take place due to the oxidation of the turpentine compound by chromic acid. After about half an hour, the mixture is heated on a water-bath to remove the water as far as possible, the loss in weight being about 8 gms. The partially dehydrated mixture is then dissolved in 30 c.c. of chloroform and the solution subsequently filtered to separate the chromium resinate from the chromium oxide formed during the reaction. From the chloroform solution, the resinate is precipitated by adding the solution drop by drop to 100 c.c. of methyl alcohol, which should be stirred continually

... after which the dried resinate, which is dark grey in colour, should be powdered and stored in a well-stoppered bottle.

RHODIUM RESINATE

The starting material for the preparation of this resinate is sodium-rhodium chloride a double salt of rhodium and sodium chloride having a rhodium content of 16-17%. To prepare the resinate 100 gms. of this salt are dissolved in 50 c.c. of distilled water and to the resulting bright red solution are added 12 gms. of barium hydroxide dissolved in 20 c.c. of hot water, whereby brick-red coloured rhodium hydroxide is precipitated. Without filtering the precipitate, the whole mixture is next heated on a water-bath until perfectly dry, at which stage the rhodium hydroxide assumes a dirty yellow colour. It is then washed with hot water to remove the excess of barium hydroxide and sodium chloride. The pure rhodium hydroxide so obtained is converted into chloride by dissolving it in 10 gms. of concentrated hydrochloric acid, when it will assume a brilliant rose ruby colour. The solution of the chloride should then be evaporated on the water-bath to remove the excess hydrochloric acid and when fumes cease to be given off it is dissolved in 60 gms. of methyl alcohol.

To prepare the rhodium resinate, 50 gms. of sulphur-turpentine compound are added to the methyl alcoholic solution of rhodium chloride, while continually stirring, and after about half an hour the methyl alcohol is evaporated from the mixture to the extent of 60 gms. The mixture consisting of rhodium resinate and unreacted sulphur-turpentine compound, is dissolved in chloroform, just sufficient in quantity for the purpose. It may be found therefore, shaken thoroughly at this stage with 10 gms. of sodium carbonate, after which it should be left for twenty-four hours to ensure complete neutralisation. The neutralised solution should then be filtered and washed with some more chloroform, after which the filtrate is added drop by drop, with continuous stirring, to 300 gms. of methyl alcohol to precipitate the rhodium resinate, which will be ... red in colour. The precipitate is washed well with methyl alcohol and allowed to dry at room temperature by spreading the filter paper, after which the dry resinate should be powdered and stored in a well-stoppered bottle.

ROSIN SOLUTION

Rosin solution is used for adjusting the gold content in liquid gold to the usual commercial proportion which is generally 12.1 per cent. To prepare this, 200 gms. of powdered pale rosin are dissolved in 135 grms. of oil of turpentine, by the aid of gentle heat on a water bath. The solution should be allowed to settle for about 3 days, and during this time it must be kept well covered to avoid dust particles. The clear supernatant liquid is finally decanted off and stored in a stoppered bottle.

BITUMEN SOLUTION

This is used to adjust the consistency and gold content of the liquid gold. To prepare this solution 50 grms. of pure bitumen are dissolved in about 100 grms. of chloroform and refluxed for about half an hour on a water bath. On cooling, the solution is filtered to separate any impurities that may be present, after which 50 grams. of nitrobenzene are added to the filtrate and the mixture heated in a beaker form. When there is no more smell of chloroform the solution of bitumen in nitro-

and placed for storage in a stoppered bottle.

COMPOUNDING OF LIQUID GOLD

When all these constituents have been prepared, the final product i.e., the liquid gold may be obtained by combining them in some definite proportions. According to Mr. H. N. Bose the following ingredients may be employed in making 100 grms. of liquid gold:—

Gold Glance with 45 p.c. gold	26.7	grms.
Bismuth resinate	6.5	"
Chromium resinate	1.2	"
Rhodium resinate	1.2	"
Rosemary oil	23.2	"
Fennel oil	9.8	"
Bitumen solution	14.0	"
Rosin solution	17.6	"

The mixture of solid bodies is ground with rosemary oil and fennel oil in a porcelain mortar, so that it becomes perfectly homogeneous. When the mixture is ready it is mixed with a separately prepared mixture of bitumen and rosin solution. The mixture is allowed to settle under cover for 2 days so that the undissolved particles may settle at the bottom. After settling the liquid gold is carefully decanted and bottled.

REFERENCE

1. The Manufacture and Application of Liquid Gold—Atma Ram, Karimulloh & Verman.

2. Pottery Decorating—R. Hainbach.

3. Modern Pottery—H. N. Bose.

Fluid Extracts of [illegible]le Drugs

FLUID extracts are concentrated liquid preparations of vegetable drugs, containing alcohol either as a solvent or as a preservative, and bearing a uniform relation to the drug used so that 1 c.c. of the fluid-extract represents approximately the activity of 1 grm. of the air-dried and powdered drug of standard quality.

The fluid extracts may be classified according to the menstrua used in the extraction of the drugs and the processes of manufacture employed. Several drugs require special manipulation to obtain satisfactory fluid extracts and for these appropriate formulas have been devised. The following type processes are described here, and in each formula the processes to be applied are designated by reference to the type process:

TYPE PROCESS A

In this class are included the fluid extracts that are made with a menstruum of alcohol, or a mixture of alcohol and water by the usual process of percolation.

TYPE PROCESS B

In this class are included those fluid-extracts in which glycerine or an acid is used in the extraction and two menstrua are successively employed. Menstruum 1 contains the glycerine or acid in definite proportion to the amount of the drug, and Menstruum II, a mixture of alcohol and water intended for completing the exhaustion of the drug.

TYPE PROCESS C

This process is called fractional or divided percolation. This is especially recommended for drugs containing volatile ingredients or constituents injured by exposure to heat. This process may likewise be used as an alternative process in the formulas in which Type Process A is directed.

TYPE PROCESS D

In this case are included those fluid-extracts in which extraction is effected by infusion and percolation with boiling water, alcohol being added to the concentrated extract as a preservative.

In the preparation of fluid extracts by either Process A, B, or C, the rate of percolation must be carefully controlled and the flow should not exceed 10 drops per minute until the reserve percolate is collected, and 20 drops per minute thereafter. With careful percolation, most drugs will be practically exhausted when the percolate from each 1000 grms. of drug measures 3000 c.c.

The percentage of alcohol in finished fluid extracts is less than that in the menstrua employed, due to loss by evaporation during manufacture, variations in the amount of water in air-dried drugs, the absorption of moisture from the air, and the variable amounts of extractive in different lots of the same drug. The percentage of alcohol in the finished product must therefore be determined.

Fluid extracts should be kept in tightly stoppered containers for one month, and then if perfectly clear they should be ambercoloured bottles protected from sunlight and extreme of temperature. If sedimentation has occurred, the clear portion should be decanted, the remainder filtered and the liquids thoroughly mixed together before storing.

DESCRIPTION OF DIFFERENT TYPE PROCESSES

The following details will assist the chemists in working the different types of processes.

TYPE PROCESS A

Moisten 1000 grms. of the well ground drug with a sufficient amount of the [illegible]

[illegible] menstruum to render it evenly and distinctly damp, and to maintain it so after standing for 6 hours in a tightly covered container. Then pack it in a cylindrical percolator, and add enough of the menstruum to saturate the powder and leave a stratum above it, when the liquid begins to drop from the percolator, close the lower orifice, and having closely covered the percolator, macerate for 48 hours. Then allow the percolation to proceed slowly, gradually adding more menstruum, until the drug is practically exhausted. Reserve the first 850 c.c. of the percolate (unless otherwise specified in the formula); recover the alcohol from the remainder and concentrate the residue to a soft extract at a temperature not exceeding 60°C dissolve this in the reserved portion, mix thoroughly, and finally add a sufficient quantity of the menstruum to obtain 1000 c.c.

DETAIL OF TYPE PROCESS B

Moisten 1000 grams. of the well ground drug with a sufficient quantity of the prescribed Menstruum I, to render it evenly and distinctly damp and to maintain it after standing for 6 hours in a tightly covered container; pack it in a cylindrical percolator, add the remainder of the Menstruum I, and, when this has just disappeared from the surface, gradually add Menstruum II, constantly keeping a stratum of liquid above the drug. When the liquid begins to drop from the percolator, close the lower orifice, and having closely covered the percolator, macerate for 48 hours, and then allow the percolation to proceed slowly, gradually adding Menstruum II, until the drug is practically exhausted. Reserve the first 850 c.c. of the percolate (unless otherwise stated in the formula); recover the alcohol from the remainder and concentrate the residue to a soft extract at a temperature not exceeding 60°C; dissolve this in the reserved portion, mix thoroughly, [illegible] sufficient quantity of [illegible] obtain 1000 c.c.

DETAIL OF TYPE PROCESS C

Divide 1000 grms. of the ground drug directed into three positions of 500 grms., 300 grms., and 200 grms. respectively. Moisten the first portion of the drug (i.e. 500 grm.) with a sufficient quantity of the prescribed menstruum to render it evenly and distinctly damp and to maintain it so standing for 6 hours in a tightly covered container. Then pack it in a cylindrical percolator and add enough of the menstruum to saturate the powder and have a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for 43 hours and then allow the percolation to proceed slowly, gradually adding more of the menstruum. Reserve the first 200 c.c. of percolate and continue the process until the additional percolate measures 1500 c.c., the latter being collected in successive portions of 300 c.c. each.

Now moisten the second portion of the drug (i.e. 300 forms) with a sufficient quantity of the percolate collected in the preceding operation immediately after the reserved portion to render it evenly and distinctly damp and to maintain it so after standing for 6 hours in a tightly covered container. Then pack it in a cylindrical percolator and macerate and percolate in the manner as described for the first part of the drug, using as menstruum the several portions of percolate from the preceding operation in the order in which they have been collected and, if this be, insufficient, follow with some of the original menstruum. Reserve the first 300 c.c. of the percolate and continue the process until the drug is practically exhausted, collecting the weaker percolate in successive portions of 200 c.c. each.

[illegible] the [illegible] portion of the drug ([illegible] grms.) with a sufficient quantity of the percolate collected in the preceding operation immediately after the reserved portion, to render it evenly and distinctly moist and to maintain it so after standing for 6 hours in a tightly covered container. Then pack it in a cylindrical percolator and macerate and percolate as before, using as menstruum, the several portions of percolate from the preceding operation in the order in which they have been collected, and if this be insufficient, follow with more of the original mestruum. Collect 500 c.c. of the percolate and mix this with the two portions previously resolved so as to make 1000 c.c. of finished product.

DETAIL OF TYPE PROCESS D

To 1000 grms. of the well ground drug add 5000 c.c. of boiling water mix thoroughly and allow it to macerate in a covered container for two hours in a warm place. Then transfer the moist drug to a tinned or enamelled metallic percolator and allow percolation to proceed, gradually adding boiling water until the drug is practically exhausted. Evaporate the percolate on a water bath or steam bath to the volume specified and when cold add the alcohol directed and mix thoroughly.

FLUID EXTRACT OF CHIRETTA

Chiretta, in No. 30 powder	10000 grams.
Alcohol, Water } quantity to make each a sufficient	1000 c.c.

Mix 600 c.c. of alcohol with 300 c.c. of water, and having moistened the powder with 350 c.c. of the mixture, pack it firmly in a cylindrical percolator, then add enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for 48 hours. Then allow the percolation to proceed, gradually adding menstruum, using the same proportions of alcohol and water as before, until the chiretta is exhausted. Reserve the first 850 c.c. of the percolate.

Distil off the alcohol from the remainder by means of a water-bath, and evaporate the residue to a soft extract, dissolve this in the reserved portion, and add enough menstruum to make the fluid extract measure 1000 c.c.

LIQUID EXTRAT OF SARSAPARILLA (B.P.)

Sarsaparilla, in coarse powder	40	oz.
Proof spirit	2	pints
Sugar	5	oz.
Distilled water	12	pints.

Mix the sarsaparilla with the spirit, macerate for 10 days; press out 20 oz. of liquor, and set it aside. Mix the pressed residue with the water, macerate at 160°F for 16 hours, strain, press, and dissolve the sugar in the liquid, evaporate to 18 oz. Mix the two liquids, make it to measure 40 oz. by adding distilled water.

Dose:—2 to 4 dr.

LIQUID EXTRACT OF BAEL (B.P.)

Bael	20	oz.
Chloroform water	300	fl. oz.
Chloroform	20	mins.
Alcohol (90 p.c.) to produce	20	fl. oz.

Bruise the bael and macerate for 12 hours with 100 fl. oz. of the chloroform water; pour off and reserve the clear liquid; repeat the maceration a second and a third time for one hour in each case, using for each maceration 100 fl. oz. of the chloroform water; press the marc and strain the mixed liquids through flannel. Evaporate to 15 fl. oz. cool, add the

chloroform dissolved in sufficient alcohol to produce the required volume, and filter.

Dose:—1 to 2 fluid drachms.

LIQUID EXTRACT OF BUCHU

Buchu, in moderately fine powder	20	oz.
Alcohol (90 p.c.) to produce	20	fl. oz.

Pack the buchu in a percolator, saturate it with alcohol, allow to stand for 48 hours, and then percolate until exhausted. Reserve the first 17 fl. oz. of percolate, evaporate the subsequent percolate to a soft extract, dissolve it in the reserved portion and add sufficient of the alcohol to produce the required volume.

Dose:—5 to 20 minims.

FLUID EXTRACT OF PUDINA

Pudina, in coarse powder	100	grms.
Alcohol	600	c. c.
Distilled water	300	c. c.

Mix 600 c. c. of alcohol with 300 c.c. of distilled water, and having moistened the powder with 350 c.c. of the mixture, pack it firmly in a cylindrical percolator, then add enough menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator, close the lower orifice, and, having closely covered the percolator, macerate for 48 hours. Then allow the percolation to proceed, gradually adding menstruum, using the same proportions of alcohol and water as before, until the pudina is exhausted. Reserve the first 850 c. c. of the percolate.

Distil off the alcohol from the remainder by means of a water-bath, and evaporate the residue to a soft extract, dissolve this in the reserve portion, and add enough menstruum to make the fluid extract measure 1000 c.c.

FLUID EXTRACT OF CUBEB

Cubeb, in moderately coarse powder 1000 grms.

Prepare the fluid extract by Type Process A, using alcohol as the menstruum.

Average dose:—15 mins.

FLUID EXTRACT OF TRIFOLIUM

Trifolium, in moderately coarse powder 1000 grms.

Prepare a fluid extract by Type Process A, using diluted alcohol as the menstruum and reserving the first 100 c.c. of the percolate.

Average dose:—1 fl. drachm.

FLUID EXTRACT OF NUX-VOMICA

Nux Vomica, in moderately coarse powder 1000 grms.

Prepare a fluid extract by Type Process A, using a mixture of 3 volumes of alcohol and 1 volume of water as the menstruum, and reserving the first 800 c.c. of percolate.

After dissolving the soft extract in the reserve, assay a portion to ascertain the amount of the alkaloid and then dilute this with enough menstruum to make each 100 c.c. of the finished extract contain 2.5 grm. of the alkaloid of Nux Vomica.

Average dose:—1½ mins.

FLUID EXTRACT OF GENTIAN

Gentian, in moderately coarse powder 1000 grms.

Prepare a fluid extract by Type Process A, using diluted alcohol as mestruum.

Average dose:—15 mins.

FLUID EXTRACT OF INDIAN HEMP

Exhaust Indian hemp in a coarse powder, with alcohol (90 per cent.) by the percolation process as described under Type process A. Collect the first 100 c.c. of the extract. Recover the alcohol by distillation, evaporate the residue to a soft

[illegible] Mix with the first extract and make up the volume by further addition of the menstruum.

Average dose:—15 mins.

FLUID EXTRACT OF ASOKA

Asoka bark, in moderately coarse powder	20	oz.
Alcohol 90 p. c.	3	fl. oz.
Distilled water to produce	20	fl. oz.

Boil the asoka bark with 40 fl. oz. of distilled water, for 30 minutes and strain. Repeat the process twice, mix the strained liquids and evaporate to 17 fl. oz. Add alcohol, set aside for 7 days, decant the clear liquid and add sufficient distilled water to produce the required volume.

FLUID EXTRATCT OF LODHRA BARK

Lodhra Bark, in coarse powder	20	oz.
Alcohol 90 p. c.	3	fl. oz.
Distilled water to produce	20	fl. oz.

Boil the lodhra bark with 40 fl. oz. of distilled water for half an hour and strain. Repeat the process twice, mix the strained liquids and evaporate to 17 fl. oz. Add the alcohol, set aside for 7 days, decant the clear liquid and add sufficient distilled water to produce the required volume.

FLUID EXTRACT OF JAMBUL FRUIT

Jambul fruit	2	parts.
Rectified spirit	1	part.
Water	1	„

Grind the jambul seed into coarse powder. Take 20 oz. of the powder and moisten it with 8 fl. oz. of the menstruum (mixture of Rectified spirit and water in the proportion stated above). Then pack it tightly in a percolator, and pour on sufficient menstruum to saturate the powder and have a stratum above it. When the liquid begins to drop, close the lower orifice and macerate for 24 hours; then allow percolation to proceed, gradually adding menstruum until the drug is exhausted. Reserve the first 17 fl. oz. of the percolate, distil off the spirit from the remainder, and evaporate the residue to a soft extract, dissolve this in the reserved portion, and add enough menstruum to make the liquid extract measure 1 pint.

—PAPER FOR TRANSFER PICTURES

THE making of transfer pictures requires a special type of paper possessing a good smooth surface only slightly sized but is capable of readily taking up the adhesive solution. The paper should be readily softened when the picture is transferred. Starch paste, gum arabic mucilage, and flour paste are used, and careful preparation is essential to the production of a good article, it being evident that defective coating of the paper with adhesive will result in the picture being imperfectly released, because the printing colour will be absorbed by the paper in such places, and will no longer separate therefrom.

The paper must therefore be uniformly coated with the adhesive, and must also be capable of taking up the adhesive evenly. The best method of applying the adhesive is by means of a broad flat brush, the paper being spread on a large table, and the solution laid on smoothly by drawing the brush to and fro. If necessary, successive coatings are given, alternately lengthwise and across the paper.

After this preparatory treatment the paper is hung up on lines in a warm room to dry, preferably in a state of tension to prevent curling, after which it is cut into sheets.

PREPARATION OF ADHESIVE PASTES

The following are some of the adhesives suitable for the paper:—

I

Starch	400	parts.
Gum Tragacanth	100	„
Glue	200	„
Ground Chalk	100	„
Gamboge	5	„

The glue, tragacanth and gamboge are steeped separately in water for 2 days to dissolve. The starch is moistened with cold water and then made into paste by pouring boiling water over the mass with continued stirring, followed by boiling with a further quantity of hot water. During this boiling the dissolved glue and tragacanth are added, followed by the chalk, the whole being left on the fire until homogeneous, whereupon the gamboge mixture is stirred in. The paste is strained through a cloth, and applied to the paper with a sponge or brush in the manner already described above. Two coatings are necessary to obtain good result.

II

Dextrin	20	parts.
Water	90	„
Glycerine	8	„

The dextrin is dissolved in water and then the glycerine is added. The solution is filtered before use.

Uniform unsized paper, not too thick, is coated with the following preparations:—

(a) A warm solution is made of 10 parts of gelatine in 300 of water and is applied evenly to the paper by means of a sponge or wide brush, the paper being laid flat on an inclined surface to dry.

(b) A second solution is prepared from:—

Starch	50	parts.
Gum tragacanth	10	„
Water	600	„

by softening the tragacanth in one-half the water, the starch being made into a stiff paste with the remainder, and the whole strained through muslin. The dried paper is next evenly and somewhat thickly coated with the tragacanth mucilage by the aid of a wide brush, and again left to dry. A third coating is applied in a similar manner, this time, however, [illegible]

dissolved albumin, prepared by mixing 1 part of blood albumin with 3 of water. By frequent shaking this dissolves in 24 hours to a cloudy liquid, which can be clarified by the addition of a little ammonia. The solution may be used with or without dilution, according to requirements. When dried the third time, the paper should have a perfectly even appearance. If the sheets curl too much, the first gelatine solution may be treated with a little glycerine, which will soften it down.

According to Miller, the paper used for transfer pictures, should be fairly strong, should not stretch, either in printing or in taking off the transfers, and when moistened should slip off sideways at the end of one or two minutes, without any of the impression sticking to its surface. Before printing, the paper must be wiped over with a damp sponge; if it does not stretch it is suitable, but if it cockles it must be discarded. To impart the necessary properties the paper must be treated in the following manner; it is first coated with a strained paste made of wheaten starch, and applied with a goat or badger-hair brush. After being dried on the flat the sheets are well pressed between sheets in a smoothing press. A second coating is applied, this time using a mixture of gum arabic mucilage and starch paste in equal parts; and the paper is then left to dry for at least 6-8 hours, so that it will not undergo any distortion in printing.

TRANSFER PAPERS FOR DECORATING GLASS (MILLER)

The paper is drawn lengthwise through a solution of:—

Common salt	100	parts.
Powdered alum	150	,,
Water	4000	,,

contained in a flat dish, and after draining is laid on a rack to dry.

Next, 250 parts of cabinetmaker's glue are softened, boiled in 1000 parts of water, and mixed with 100 parts of glycerine, 25 parts of common salt, and enough coal tar dye to give a recognisable tinge to the prepared surface of the paper the pan containing the mixture being then placed in water, and the contents stirred until cold. If a trial film of this coating is found to be brittle on drying, more glycerine is added and well stirred in. When cold, the whole is strained through a cloth. Two coatings are applied to the paper.

TRANSFER PAPER FOR DECORATING GLASS

One hundred parts of wheaten starch and 400 parts of soft or distilled water are stirred in a pan, and the resulting paste is coloured with a little gamboge or coal tar dye, this being used chiefly for the purpose of showing which is the treated side of the paper.

Common salt	25	parts.
Pure glycerine	70	,,
Softened glue	50	,,
Molasses	25	,,

are raised to the boil, and when all is dissolved the starch paste is added, with stirring, the whole being boiled up for short time. On being taken off the fire the mass is stirred till cold, and strained through a linen cloth into a clean dish. The paper receives two coatings of this mucilage, and after drying is smoothed between rollers.

TRANSFER PAPER FOR GLASS ETCHING (HOCK)

The paper for making the transfers must be thin, unsized, smooth, soft, and free from lumps or other defects which would prevent it adhering properly to the rounded surface of the glasses. When obtainable cheaply, fresh albumin can be

employed to prime the paper for printing the designs. As this material, however, is usually too dear, the following method must be adopted:—

The sheet of paper having been shaped to the proper form is steeped in a suitable vessel with a fairly dilute solution of ammonium sulphate. In order to keep the paper clean and ensure uniform penetration of the solution, the operator's hands must be free from grease. The paper is next hung carefully on rods to dry. When dried, it is coated with a suitable substitute for albumin, e.g. ordinary starch paste, prepared by the warm method, and stained deep yellow with an aqueous solution of gamboge. This paste is laid on evenly and moderately thick with a wide brush. When dried and glazed between rollers the paper is ready for printing, and must be stored in a very dry place.

LITHOGRAPHIC TRANSFER PAPERS

These papers are prepared in the same way as transfer pictures already described, the paper being coated with a film, that prevents the printing colour from penetrating the fibre of the paper, and keeps it on the surface of the film, so that it can be transferred completely on to stone, zinc, etc.

250 parts of starch are mixed with a little cold water, 1000 parts of boiling water being added slowly with constant stirring. This preparation is treated with a mixture of 10 parts of neutral chrome yellow and 4 parts of gum arabic, dissolved in water. 500 parts of pure glycerine are next added, and the whole is stirred until cold, to prevent the formation of a crust.

To remove all undissolved or other solid impurities, the preparation is carefully strained through a bolting cloth, and will then be ready for application to the paper. It is laid on with a flat brush and as evenly as possible, the sheets being afterwards hung up to dry in the air. This transfer paper will keep moist, and can therefore be stored in an unrolled state; the stone or plate will not require wetting, and the transfer will remain the same size as the negative.

UNSTRETCHABLE TRANSFER PAPER

Ordinary transfer paper for photo-litho work is liable to stretch in the press, a circumstance that is disadvantageous in some reproductions. To remedy this, Otto floats Steinbach paper on a solution of:—

Shellac	1000	parts.
Borax	250	,,
Water	5000	,,

and coats it, after drying, with a solution of 140 parts of gelatine in 2000 of water mixed with another solution of 60 parts of shellac in 1000 of alcohol.

These coatings form the substratum for the true or gelatine-albumin layer, which, after immersion in a bichromate bath, is exposed under a negative and rubbed over with transfer ink. The method gives very satisfactory results.

TRANSFER PAPER

Starch	1	part.
Flour	⅛	,,
Gelatine	⅛	,,
White lead	½	,,

The flour is stirred with cold water to uniform pulp, the starch being added with just sufficient water to enable the mass to be stirred. The gelatine having been dissolved in water is next stirred in boiling hot, this condition being essential to success. Last of all the white lead is added.

AUTOGRAPHIC PAPER

The following instructions, if carefully observed will give a paper that will transfer the finest points and most delicate

lines to the stone with such fidelity that the plate can be etched without any re-touching, and will give thousands of excellent prints.

Strong, unsized printing paper is treated with a mixture of:—

A

Gelatine	10	parts.
Water	100	„

B

Tannin	5	parts.
Water	100	„

The paper is spread out flat on a plate and coated with the gelatine solution by pouring, the plate being then tilted to enable any surplus to drain off. This done, the tannin solution is poured on the paper, and when dry the cycle of operations is repeated two or three times, the paper being then well dried and strongly pressed in the satinising machine. This paper will produce on the stone the finest writing or drawing, and even the finest copper or steel engraving can be transferred to the stone by taking a pull from the plate with autographic ink on to this paper, and transferring the latter to the stone.

—Hardening, Tempering & Annealing Tools

IN making a set of tools of any kind, the first thing to do is to test the steel that is to be used if its quality is not already known. Cut a piece off, make it red hot, and quench in clean cold water. If steel will not harden when treated thus it is unsuitable for the purpose.

To harden tools requires considerable experience; heating steel above a cherry red may render it useless as a cutting tool. It is well to remember that the lower the heat at which a tool will harden, the longer will it last as a cutting tool.

Brittleness, or constant chipping of the cutting edge, is generally caused by overheating or burning the steel during the process of hardening; one cannot be too careful in this matter.

When satisfied as to the quality of the steel, cut off the necessary number of pieces and anneal them. This may be accomplished by heating to a cherry red and allowing them to cool slowly, either in a box of dry lime or in a metal box containing dry sawdust.

For some class of tools these pieces of steel should be roughed out, then re-annealed, and when making cutting-dies it should not be forgotten to allow for machining off a full 1/16 in from the face of the die.

Hardening mediums may be summarised briefly as follows: Clean cold water, warm water, oil and water (about 3 in. of whale oil on the surface of a tank of water). The oil has a very soothing effect on hot steel when quenched in this bath—whale oil only, or salt and water. Whichever bath is being used for hardening, never take the steel out until it is quite cold, or it may crack. After taking it from the liquid, heat it on a hot plate until the tool or die is just too hot to hold in the hand.

This will relieve it of any internal strains that may have been set up while hardening. Allow the steel to cool down before tempering. Plunge the tool vertically into the bath, not at an angle, otherwise warping will occur.

The following points should be remembered when hardening. Stop all holes with fire-clay, heat the steel up slowly, using a muffle whenever possible, When the tool has reached the hardening stage, shut off the gas and allow the hot steel to soak for some minutes before quenching.

Keep it in the bath until it has reached the same temperature as the liquid, and after removal heat it up on a hot plate to relieve it of any internal strains.

Then temper slowly, uniformly heating the die throughout by turning it over occasionally, and stand aside to cool when it has reached the desired colour, or at once quench in water.

When circular dies are made, it is the best practice to harden and grind these dies to size; this can be accomplished on the ordinary grinder. There are, however, some small shops where a grinder is not available, and the following apparatus can be easily made to clamp to the slide rest of the lathe. While the work is mounted on a chuck or face plate, the grinder is driven from a drum attached to the overhead countershaft.

A casting is bored through to take the two hardened bushes, one at each end, and it should be a light press fit into the casting. The centre holes in these are ½ in. diameter and ground to take the spindle.

This spindle should be hardened and ground at the middle, a small key being inserted at one end on which the pulley fits. This has a keyway to correspond, and is fastened by two lock-nuts, the end being ⅝ in. diameter and threaded to take various emery wheels which are clamped by the nut.

When grinding out small dies a long spindle should be used; this is schewed on to the end of the spindle, and enables a small emery wheel to be attached and fastened by a nut. This will be found a useful attachment for grinding and facing dies and similar work. It is set up in a slide rest and the slide set over to any desired angle, and is so attached that the centre of the spindle should be on a level with the centre of the lathe spindle

To reduce the degree of brittleness brought about by the process of hardening, resort is had to tempering. The hardness suffers, too, in the course of tempering, but a compromise between hardness and brittleness on the one hand and softness and toughness on the other is sought. In tempering, the steel is heated to a moderate temperature, the degree of which chiefly determines the result, the method of cooling—whether by allowing it to cool in air or by quenching in cold water—making no difference. The higher the temperature to which the steel is heated in tempering, the more will the hardness be reduced. The proper temperature is generally recognised by means of the colour tint assumed by the film of oxide upon the surface of the tool, the tint becoming deeper as the temperature rises. Unfortunately, the tint depends upon the duration of heating as well as upon the actual temperature attained, and therefore a high degree of experience and judgment is necessary on the part of the operator.

ANNEALING SHEET METAL

During the pressing of sheet metal to a given shape it becomes harder and less malleable. Sometimes a desired shape can be obtained without annealing, but, where the shape is complicated and requires a series of "drawing" operations annealing cannot be avoided, and may even have to be repeated before a given shape can be obtained. Annealing relieves the strains and stresses set up by the act of stretching and so opens the grain and restores its malleability.

Iron—To anneal this metal bring it to a red heat and allow it gradually to cool down. (Sometimes the cooling is allowed to take place in a lime box).

Copper —A peculiar characteristic of copper is that it becomes annealed by heating to a dull red heat and then quenching in water. It can also be annealed by heating and allowing to cool, but the quenching method is the better, as it allows the work to be quickly handled.

Brass.—The remarks made regarding copper apply also to brass. When a sheet of brass cannot be annealed by the quenching process it is generally found to be unsuitable for pressing.

Zinc.—This metal is most malleable when at a temperature a little above that of boiling water. Instead, then, of annealing in the usual manner it will be found advantageous to warm it slightly.

Aluminium.—Less annealing is necessary with this metal than with those previously mentioned; indeed, it is only in exceptional cases that annealing is resorted to. Kerosene or paraffin oil should be used as a lubricant for punch pressings and for shallow draw-press work, but for deep drawings lard, oil, or cheap petroleum jelly or vaseline is advantageous. A suitable temperature for annealing is from 750° to 850° Fahrenheit.

—PROPAGATION OF PLANTS

PROPAGATION of plants is one of the most important branches of horticulture and every planter ought to know this in order to be a successful plant breeder.

There are various ways by which the plants are propagated some of which increase at a rapid rate by one method cannot be similarly raised by another, while in some cases all methods of propagation fail. The following are the principal modes of propagation in use.

PROPAGATION BY SEED

This is the most natural mode of increase, and is the one by which the vast majority of plants naturally spread and produce their kind, the offspring being more or less true according as the flowers are not disposed to be fertilised by foreign pollen, or cross-fertilised. The propagation of seed may be said to be the aim of the life of every plant in a state of nature. But exact counterparts of the parent plants cannot be ensured by raising from seed; therefore, propagation by vegetative means, as by cuttings etc. is often resorted to in high cultivation.

PROPAGATION BY CUTTINGS

Propagation by cuttings is, with the exception of seeds, commonest method of propagation, and has the advantage of reproducing the characters of the parent as if the cutting were still a part of it whereas the special characters of the parent are not always perpetuated from seed. In the tropics, a very large proportion of plants and trees may be readily propagated by cuttings, provided these are inserted in damp soil during rainy weather. Some species strike root so easily that if stems or branches are used as fence posts they will rapidly develop roots and sprout into leaf. In other cases, however, as with species characterised by hard wood or hollow stems, it is difficult, if not impossible, to induce cuttings to strike root. For successful propagation by cuttings the following conditions are important: (1) firm and sufficiently ripened shoots from which the cuttings are taken; (2) a suitable rooting medium composed of a light porous soil, or fine wet sand only; and (3) if possible, a higher temperature with closer atmosphere than those in which the plants grow normally.

All cuttings should have the soil well pressed around them. It is believed that cuttings usually strike root more readily if inserted in the ground slopingwise instead of erect and in the East the gardeners invariably practise the former method, not only in planting cutting of general ornamental plants, but also field crops, as cassava, sugar-cane, as well as hedges, etc.

PROPAGATION BY LAYERS

When propagation by cuttings fails, layering may be resorted to, the latter, though a slower process, being generally a more certain method. The usual procedure is as follows· Select a branch of ripened wood that will bear being bent down to the earth without breaking; cut the branch half-through with a sharp knife just under one of the leaf-buds towards its extremity, passing the knife upwards, and slitting the branch about an inch or two up. The slip piece, with the leaf-bud at its extremity called the "tongue", should be kept open by inserting a small pebble. Bend the branch down, and where the tongue falls remove the earth to the depth of 2 or 3 inches;

he tongue portion held down and secured in position by a forked peg, and then covered over with a mixture of fine sand and leaf-mould. This must be kept shaded and moist, and may be protected by an inverted flower-pot or other means.

PROPAGATION BY SUCKERS

A sucker is a stem or shoot which springs from a subterranean portion of a plant or tree. Two kinds of suckers may be distinguished, namely root suckers, which arise from adventitious buds on the roots, and stem-suckers or ratoons, which spring from the base of the stem, e.g., pineapple. The former can be served from the parent plant and removed with roots attached, e.g. bananas and bread fruit. Stem suckers are sometimes called "gourmanalisers" as their growth is at the expense of the part of the plant above them. Plants which have been heavily pruned often produce stem-suckers freely. The latter, when required for propagation, may be encouraged to produce roots by partly severing them with a deep cut, and bandaging them up with some good sandy loam, which should be kept moist.

PROPAGATION BY EYES

Many plants especially those of a succulent nature, may be propagated readily by eyes or buds. The method is simply to take a plump shoot or stem on which there are buds not yet developed; cut this in a slanting direction into short lengths, about ½ inch above and below the buds. The pieces, having at least one eye or bud upon each, are planted in a pot or box of fine sandy soil, with which they should be put covered, being firmly pressed down. They should be kept moist and shaded, and may be covered with a sheet of glass.

PROPAGATION BY LEAVES

Many succulent plants, as begonias gloxinia, bryophyllum, etc. may be increased from leaves. The latter, if placed on a damp surface of light sandy soil, and kept in position by being partly buried or held down with small wooden pegs, will produce buds at the margins which will develop into plants.

PROPAGATION BY ROOTS

Some plants may readily be increased by cuttings of the roots, these being inserted in a sandy mixture of leaf-mould, etc. and kept damp and shaded. Aerial roots, developed from the upper limbs or branches of species of Ficus and other trees, may sometimes be used as a means of propagation. When these reach the ground they at once fix themselves in the soil, and in a short time form stout independent columns or trunks. The latter will afford support to the parent tree and thus prolong its life; or they may be severed and thus become independent trees. The method usually adopted for enabling the aerial roots of certain species of Ficus to reach the ground and strike root is as follows: Long bamboo stems are split into two, the transverse divisions being cut out; the two-halves are placed together round the aerial root and tied at intervals, the lower ends being securely fixed in the ground. The top end is filled in tightly with moss to prevent the ingress of rats or squirrels, which are apt to damage the young roots.

PROPAGATION BY BULBS AND TUBERS

Bulbs or Tubers may appear on plants either underground, or in the stem or branches above ground. In some Yams (Dioscorea) both underground and aerial tubers are found on the same plant. Bulbil, a term intended for a small bulb, is also applied to aerial buds when they resemble small bulbs, as in agave, furcraea, certain ferns, etc. Sometimes such bulbils are produced in large numbers

(e.g. Sisal-hemp), and function as seeds as a means of reproduction, the seeds themselves being abortive or infertile. A tuber is a thickened rhizome or stem, bearing buds or mode-like scars, e.g. of which are yams, sweet-potato, arrowroot, etc. Propagation of these is readily effected by division.

PROPAGATION BY RUNNERS, RHIZOMES, ETC.

This natural mode of propagation is well seen in the strawberry plant and in many running grasses and sedges, e.g., doob-grass, nut-grass, (syperus, rotundus), etc. A slender branch is sent off from the base of the stem; it runs along the ground, and at its end produces a new plant. Some plants have creeping stems (rhizomes), which root along their under surface, and develop new plants from buds on the upper side. This is characteristic of the ginger family and most grasses. Crowns are a means of propagation in the case of pineapples, a prolongation of the main axis forming a tuft of leaves at the top of the fruit.



PHARMACEUTICAL RECIPES

POTASSIUM CITRATE

To prepare potassium citrate weigh out 216 grams. of citric acid and 100 grams. of potassium bicarbonate. Now dissolve the two separately in equal quantity of hot water and mix. The potassium of the bicarbonate unites with the citric acid to form the potassium citrate, and the carbon dioxide escapes producing effervescence.

When the effervescence has been ceased evaporate the solution to dryness on a water bath.

SODIUM CITRATE

The official salt is the normal salt of citric acid and sodium, there being possible combinations owing to the trifold basicity of citric acid. It may be prepared by adding to a hot aqueous solution of 59 parts of citric acid an aqueous solution of 53 parts of sodium bicarbonate. The resulting mixture is next concentrated and set aside whereby crystals of sodium citrate are obtained.

CHRONIC ECZEMA

Resorcin	15	grains.
Zinc oxide	2	drams.
Bismuth subnitrate	2	drams.
Petrolatum	1	ounce.

Apply thrice daily on the affected parts.

SYRUP OF HYPOPHOSPHITE OF LIME

Calcium hypophosphite	35.0	gm.
Hypophosphorous acid	1.5	mils.
Sugar	775.0	gm.

Distilled water, sufficient to make 1000 mils.

Dissolve the calcium hypophosphite with the aid of the hypophosphorous acid in 500 mils. of distilled water, filter the solution, add the sugar to the filtrate, and after this has been dissolved by agitation, add sufficient distilled water to make the product measure 1000 millilitres.

DANDRUFF CURE

Salicylic acid	6	dr.
Castor oil	90	tolas.
Lavender oil	2	oz.
Bergamot oil	1	„
Industrial spirit	2¼	gallons.

Mix the liquids and dissolve the acid in the mixture. Rub the scalp once or twice daily with this lotion.

INFLUENZA SMELLING SALTS

Oil of eucalyptus	1	oz.
Phenol	½	„
Strong solution of ammonia	1	„
Ammonium carbonate	4	„

Mix and put in well stoppered bottles.

CAMPHOR ICE

Stearic acid	8	lbs.
Lard	10	„
Spermaceti	5	„
White wax	5	„

Melt all the ingredients on a water bath in an earthen or porcelain dish; strain into a similar vessel; add a solution of 2 oz. powdered borax in 1 lb. of glycerine, previously warmed, to the melted substance when at the point of cooling; stir well; add camphor, 2 lbs. powdered by means of alcohol 3 oz., stir well and pour into moulds.

SYRUP TOLU

Balsam tolu	25	grams.
Sugar	600	„
Distilled water, sufficient to produce	1000	„

The balsam of tolu is boiled gently for half an hour with some of the distilled water added while boiling, stirring frequently. During the heating the dish should be loosely covered by a large dish. The dish is removed from the water bath and the weight adjusted, if necessary. It should be noted that the first quantity of water has to be weighed in, since that it is boiling it cannot well be measured; consequently as the dish and balsam have been tared, the adjustment to the proper weight is done by replacing the dish on the scales and adding water until the specified weight is attained.

The hot water takes into solution some of the aromatic principles of the balsam and also some of the benzoic and cinnamic acids. On cooling these aromatic acids crystallise out, so that solution must be quite cold before it is filtered from the 80 per cent. or so of water insoluble resin that the balsam contains.

The sugar is added to the filtrate contained in another tared dish, and dissolved on a water-bath, finally adding sufficient distilled water to produce the correct weight.

Dose —120 minims.

CHLORODYNE

I.

Chloroform	1 fl.oz.	96 m.
Morphine Hydrochloride		44 gr.
Tincture of Indian Hemp		188 m.
Tincture of Capsicum		144 m.
Liquid Ext. of Liquorice	2 fl.oz.	192 m.
Mucilage of Gum Acacia	2 fl.oz.	192 m.
Treacle	5 fl.oz.	
Glycerine	4 fl oz.	192 m.
Spirit of Peppermint		96 m.

Alcohol 90 p.c. to make 20 fl.oz.

Dose:—1 oz.

II

Spt. Menth. Pip.	2	oz.
Spt. Camphor	2	dr.
Spt. Chloroform	2	„
Tr. Capsicum	2	„
Tr. Zingib	2	„
Tr. Catechu	6	„
Tr. Digitalis	1	oz.
Acid Hydrochloric Dil	2	dr.
Glycerine	3	oz.
Rectified Spirit	2	„

The above two are used in cholera cases.

—Recipes for Small Manufacturers

VINEGAR FROM PINEAPPLE

Pare the pine-apple and cut into slices. Pound the slices on a clean stone slab and express the juice. Strain and take 10 srs. Put into an earthen vessel, and apply heat Remove when it bubbles up and strain when cool. Fill a wide-mouthed jar with it, close the mouth well and place in the sun and dew. After 10 or 12 days a film will form, then strain and put back again in the jar. Finally when the film ceases to appear, strain and bottle

GOLD COLOURING ON TIN

Shellac	5	oz.
Turmeric	2	„
Gamboge	2	„
Dragon's blood	4	dr.
Methylated spirit	3	pints.

Dissolve the ingredients in methylated spirit and apply the lacquer on tin articles which should be thoroughly cleaned with soft soap and hot water and warmed.

SILVERING BY DIPPING

Silver nitrate	5 64	drachms.
Potassium cyanide	2 23	oz.
Distilled water	1	quart.

To prepare the bath dissolve the silver nitrate in 1 pint of distilled water, then potassium cyanide in the remaining pint of water and mix the two solutions. For silvering the bath is heated in a porcelain or enamelled iron vessel to between 176°F to 194°, and thoroughly cleansed and pickled articles are immersed in it until they are uniformly silvered.

By this process the article of copper, brass, or any other alloy can be silvered.

KEROCLEAN

This non-inflammable cleanser removes great spots from delicate fabrics without injury, cleans all kinds of jewellery and tableware by removing fats and tarnish, kills moths, insects and household pests by suffocation and extermination, and cleans ironware by removing rust, brassware by removing verdigris It is as clear as water and will stand any fire test.

Kerosene	1	lb.
Carbon tetrachloride	3	lbs.
Citronella oil	2	oz

Mix, and filter if necessary.

ROOF STOPPING

Rosin	56	lbs.
Paraffin wax	20	„
Calcined flint	40	„
Raw linseed oil	3	gallons.
Red lead	3	lbs.
Wood tar	3	„
Slaked lime	3	„

Boil the oil with the red lead, melt in the rosin and the wax. Heat the tar and lime together, add to the oil mixture, then add the calcined flint and thoroughly mix.

For stopping roofs, melt in a ladle and pour along the cracks and run well in with a plumber's soldering iron.

CANDY STICKS

Melt 1 lb. granulated sugar in 1 gill of water, add 4 oz. glucose and stir until dissolved. Boil until the toffee breaks crisply when put in cold water. Then pour to a large earthenware dish and flavour and colour to taste. Fold over and over with a wooden spatula, and when cool pull out with the hands, double and pull again until it is too hard to work any longer. The last pulling should be rather thin. Cut in sticks and put in an airtight bottle.

A great variety of this inexpensive and wholesome sweet can be made by adding different flavour and colour.

TAMBULAMRIT

Cloves	1	tola.
Seeds of cardamom minor	2	tolas.
Cinnamon	½	tola.
Rose water		q. s.
Chua	1	ch.

Macerate the solid ingredients in a stone mortar with rose water to a paste. Mix into this paste chua and store in gallipots.

WAX PENCILS

Spermaceti	4	parts.
Tallow	3	„
Wax	2	„

Melt the ingredients over a slow fire and add to this, with constant stirring:—

Red lead	6	parts.
Potash	1	part.

Continue to heat the mass for half an hour and then pour it into small glass tubes the size of a lead pencil. When the compound has become cold it is forced out and sharpened with a knife.

IMITATION GOLD

Copper	190	tolas.
Gold	2½	„
Aluminium	7½	„

Melt the three metals separately in crucibles composed of refractory material or of a mixture of unburnt fire-clay and dust of fire bricks, glass pots or segars and when the metals are fluid pour gold into copper solution and add the aluminium. When not more than 2 lbs. of the alloy are made at one time the mass is kept in a fuse state for half an hour, about 1½ oz. of borax being added as a flux. The melted mass is then poured into ingots.

—IN THE FIELD OF INVENTION

NEW GLAXO PRODUCTS

Glaxo Laboratories, Ltd., announce the introduction of Casinal, a soluble protein food of exceptional nutritional value. Casinal is the calcium salt of milk casein; it is prepared by a process of roller drying which produces a fine odourless powder that can be readily used in invalid or every-day meals without affecting their flavour or texture.

Glaxo Laboratories also announce the introduction of penicillin oral tablets. Each tablet contains 200,000 units of crystalline penicillin G sodium.

TEMPERATURE CONTROLLER

Entirely new instrument, based on electronic principles for automatically maintaining an electric furnace at any desired temperature, is the Towers automatic temperature controller. The instrument is operated by a thermocouple placed inside the furnace, and it consists of a pyrometer indicator graduated in degrees centigrade fitted with an additional pointer which is set at the required temperature. This pointer is connected to a Fielden Tektor meter relay circuit, and when the temperature indicating needle reaches it, the electrical capacity of the circuit is affected and a relay is operated, switching off the supply to the furnace. Similarly, when the temperature drops, the supply is switched on again. The accuracy of the Controller is largely dependent upon the length of scale of the pyrometer indicator and the type of furnace used. The standard model illustrated with a 3 inch diameter dial reading 0–1100°C. used with Tower muffle furnace, will maintain the temperature within plus or minus 10°C.

A great advantage in using the controller is the avoidance of burning out the furnace, due to an oversight. The controller automatically switches off the furnace when the desired temperature is reached. It replaces the normal type of temperature regulator such as a rheostat or energy regulator, and also includes a pyrometer indicator.

The instrument is fitted in an enamelled metal case for wall mounting and is provided with indicator lamps, mains switch, fuses, thermocouple and flexible conduit for connection to furnace.

TWO NEEDLE SEWING MACHINE

A new sewing machine, designated as Type 1101, with two needles and two loopers, producing two rows of the double-locked chain stitch, has been developed and is now in commercial production by the Willcox and Gibbs Sewing Machine Company, New York City. The machine, designed primarily for sleeve setting in shirts, pyjamas, dresses, etc., can also be used for two-needle lap seam felling operations on a wide variety of garments made from many different grades of material.

Among the new features incorporated into the machine, which officials say permits increased production at reduced overall cost, is a newly-designed compensating foot with flexible heel and toe principles for crossing bulky seams. The foot is constructed with yielding sides, permitting instant change from light to medium-weight fabrics without adjustments or interchange of parts.

Another important development is a unique lubrication system which is semi-automatic in principle but completely automatic when the machine is in operation. This is of the reservoir type, with filtered oil feed to each bearing by capillary action through oil wicks. Manual oiling thus is not required. The machine's "needles in line" set-up assures accurate margin control, while the thread handling means is located at a convenient point in front of the machine, with all threads enclosed in newly designed guides to prevent whipping or snarling as the threads pass through at high speeds. This eliminates unnecessary thread breakage.

Other features are a long-wearing internal belt drive of special composition, reinforced with steel wire, and a new type of arm shaft encased in a rigid eccentric sleeve bearing. The new arm shaft is claimed virtually to eliminate vibration and assure smooth, quiet operation.

WAX CASTING

The method comprises in the production (via a master pattern in wood or metal and a soft die) of a positive replica in wax of the desired moulding. The method is being increasingly used in the production of gas turbine blades and other precision castings for which it offers the advantages of producing castings of such good surface, finish and accuracy that subsequent machining is unnecessary. Further it enables the production of shapes too complicated or irregular for ordinary moulding methods.

The wax replica is invested in a refractory mould. The wax is melted away and the mould is then baked. The metal component is next cast. Refractories bonded by ethyl silicate have been found most suitable for the investing mould. By lowering the amount of the scrap produced and cutting down the sequence of operations, the method is expected to prove to be sufficiently economical to permit wide application in general foundry practice.

(Chem. Trade J., 1950, 120, 135).

ALUMINIUM WELDING

A new process, 4 times faster than any previously known method of joining aluminium plates, ⅛" to 3' or more in thickness, has been developed (Chem. Eng., 1950, 57, 150). The process, known as aircomatic, uses a pistol-shaped welding tool with bare or processed filter metal in wire form supplied at controllable rates of speed. A sheath of argon or helium gas surrounds the arc, preventing air from coming in contact with the molten metal. Since no solid fluxes are required, there is no slag to be cleaned from the joint.

MAGENTA

3765 R.S.S., Gwalior—Desires to know formulas and processes of preparing magenta, etc.

Aniline	20	grams.
Commercial toluidine	80	„
Hydrochloric acid conc.	67	„
Nitrobenzine	65	„
Iron dust	3	„

Fourteen grams of aniline and 54 grams of toluidine are mixed together in a porcelain basin and the hydrochloric acid added. The mixture of hydrochlorides is heated till the temperature is 130°C, when it is transferred to a round flask of one-quarter-litre capacity, in which has been placed the rest of the aniline and toluidine together with nitrobenzine.

The flask is now connected with an air-condenser and the temperature raised gradually to 180°C, which is maintained for 6 to 8 hours. The melt is finished when a sample withdrawn on a glass rod solidifies on cooling.

When this point is reached the contents of the flask are distilled with steam, when a mixture of red oil and nitrobenzine passes over. The melt is now poured into 500 c.c. of boiling water, well stirred, and 12 c.c. concentrated hydrochloric acid added slowly. As soon as an acid reaction has been obtained, 25 grams of salt are added, and the whole boiled for a few minutes.

The aqueous solution which is poured off contains the hydrochloride of aniline and toluidine which, as well as the previous distillates is, on the large scale, used again in the manufacture. The residue is allowed to cool, and solidifies to a green, brittle mass.

This is then broken up and extracted with 1½ litres of boiling water containing 12 c.c. of hydrochloric acid which dissolves the magenta. After filtering, the solution is allowed to cool to 60°C, when a little violet colouring matter separates out, which is filtered off.

Salt is now added to the magenta solution, the weight being the same as the weight of the crude salt. After standing some time the crude magenta, separates out, is filtered off, and re-crystallised from water containing a little hydrochloric acid.

The filtrates from the purification of magenta are worked up, and the colouring matters obtained from them are sold under the names of Phosphine, Maroon, Cerise, etc.

RHODAMINE B

Diethylmeta-aminophenol	5	grames.
Phthalic anhydride	9	„
Anhydrous zinc chloride	6	„

The aminophenol and the anhydride are well mixed together in a mortar and the mixture transferred to a nickel crucible, which is heated in an oil-bath. The temperature is raised slowly to 100°, the flame withdrawn, and the powdered zinc chloride added, the whole being well stirred. The temperature is then raised gradually to 180°, water vapour being given off, and reaction is finished when a sample withdrawn by a glass rod completely solidifies on cooling. This takes about four to five hours. The solid product, when cold, is finely powdered and extracted with boiling alcohol under a reflux condenser. The alcoholic solution is filtered and allowed to stand. The colour-base crystallises out and is filtered off. The base is dissolved in a small quantity of water and dilute hydrochloric acid, and the solution allowed to cool, when the hydrochloride separates out; it is filtered off, and dried on a porous plate.

METHYL VIOLET B

Sodium chloride	875	grammes.
Copper sulphate	50	„
Phenol	40	„
Dimethylaniline	100	„

The salt and copper sulphate (finely powdered) are well mixed together in a mortar, a solution of 40 grammes of phenol in 10 c.c. of water added, and the whole stirred well. The dimethylaniline is now added, and the mixture transferred to a round flask and heated on the water-bath for eight hours at 55°. The product is poured out into a porcelain basin and allowed to cool. In order to free it from common salt, it is broken up and added gradually to 3 litres of boiling water, to which has been added milk of lime prepared from 40 grammes of quicklime and 200 c.c. of water. After heating until no more lumps are present, the mixture is allowed to settle, and the clear solution of salt and calcium decanted.

The residue of copper oxide, Methyl Violet and calcium sulphate is washed again by decantation and finally filtered.

The residue is boiled with dilute sulphuric acid, which dissolves both the oxide and the dyestuff; sodium sulphate (free from chloride) is then added to precipitate the dye (as sulphate), which is filtered off and washed. The precipitated Violet is subsequently dissolved in water and reprecipitated with salt as chloride.

PIPE TOBACCO

3823 O.I., Pannipiliya—Desires to know a method of making pipe tobacco.

To make pipe tobacco take cured tobacco and damp it with the least amount of water. Then pass the leaf through a cutting machine adjusted to yield very thin strips. Now put the cut leaves over a stove to remove the excess of moisture and to develop flavour. Next perfume the tobacco with the following compound scent by spraying:—

Coumarin	50	parts.
Sweet Orange oil	20	"
Bergamot oil	30	"
Lemon oil	30	"
Phenylethyl valerianate	20	"
Cassia oil	5	"
Geranium oil	50	"
Clove oil	15	"
Tonkabean tincture	30	"
Tincture of vanilla	250	"
Tincture of orris	500	"

FRENCH POLISH

Shellac	30	parts.
Gum copal	15	"
Gum arabic	7	"
Methylated spirit	700	"
Vermillion	5	"

First of all pulverise the shellac, copal and gum arabic and then put into the spirit. Keep aside for 4 or 5 days stirring once a day. When dissolved strain through a cloth and keep in a well stoppered bottle.

WATCH OIL

3825 R.S.M., Bombay—Wants to have a good formula of watch oil.

Stir up for some time best olive oil with water kept at the boiling point; then after the two fluids have separated, decant the oil and shake up with a little freshly burned lime. Let the mixture stand for some weeks in a bottle exposed to the sunlight and air, but protected from wet and dirt. When filtered, the oil will never thicken or become rancid.

PARCHMENT SLATES

3829 J.P.S., Gumla—Desires to know a method of making parchment slate.

Good paper is soaked in boiled linseed oil and coated with several layers of the following composition:—

Copal Varnish	1	part.
Turpentine oil	2	parts.
Fine sand (quartz)	1	part.
Powdered glass	1	"
Ground slate	2	parts.
Lampblack or carbon black	1	part.

Mix intimately all together and grind fine. Coat the paper board with a flat brush. Allow it to dry in air and apply a second coat. Again allow it to dry and apply another coat. In this way several coatings are applied. The finished sheets can be written on with either lead or slate pencil.

CRUSHED PINEAPPLE FRUIT

3827 N.A.S.O., Bellary—Want to have recipes of crushed pineapple fruit and orange fruit-syrup.

Crushed pineapple	30	lbs.
Cane sugar	15	"
Sodium benzoate	18	gr.
Powdered pectin	3	oz.
Distilled water	1	gal.

Mix the powdered pectin with 5 lbs. of sugar. Add this to the boiling water, while stirring, then add balance of the sugar and cook to 220°F. Now add crushed pineapple and cook to 225°F. Shut off steam and add the sodium benzoate previously dissolved in 5 oz. of water. Stir around and then transfer immediately to the cooling table.

CRUSHED ORANGE FRUIT SYRUP

Orange pulp	50	lbs.
Cane sugar	50	"
Sodidum benzoate	1½	oz.
Powdered pectin	2	"
Citric acid	4	"
Distilled water	1	gal.

Prepare the above in the same manner as for crushed pineapple fruit.

MICANITE

29 W.A., Giridih—Desires to learn the process of making micanite.

Micanite is generally prepared with mica splittings. For this purpose the thin mica, usually about 0.001 inch in thickness, are assembled into a sheet, either by hand or by machinery. The binding material, a solution of shellac in spirit, is then applied evenly. Another layer of films is now added with more binder and so on, until after heat and compression, a mica board of the required thickness is obtained. Good mica board or micanite plate should be even in thickness and density, it should possess a very low compressibility and should not show any oozing of the binder. The content of the latter ought not to exceed 3 or 4 per cent.

Micanite can be made in sheets of any size and can be cut, moulded or pressed into any shape. It is marketed in plates, segment rings for commutators, end rings, tubes, washers, brushes, and troughs. Flexible mica cloth, paper and tape, partly made of or covered with mica, are sold for various insulating purposes.

PRESERVING POTATOES

52 B.D.G., New Delhi—Wishes to know a method of preserving potatoes.

To preserve potatoes dip them in boiling water in the following manner: Put the potatoes in a basket as large as the vessel containing the boiling water will admit and then just dip them in it for a minute or two at the utmost. The germ, which is so near the skin, is thus destroyed without injury to the potato. In this way several tons might be cured in a few hours. They should then be dried in a warm oven and laid up in sacks in a dry place.

MANGO PRESERVES.

86 A.C., Goa—Wants to have a process of making mango preserves.

Prepared Mango	2	lbs.
Sugar	2	,,
Water	2	,,

Peel, and cut the fruits in proper sizes. Dissolve the sugar in water, and boil. Then add the mango pieces and boil the whole for half an hour or until the fruit is cooked, and the syrup is thickened heavily. Then remove from the fire, and allow it to cool; then pour into jars, and seal.

CHEWING TOBACCO

142 V.S., Salem—Desires to know the method of preparing chewing tobacco.

Many kinds of chewing tobacco are manufactured but the more important types appear to be Zarda, paste or Qiwam, granules or Danedar and pills.

In the preparation of Zarda the tobacco leaf is first broken into small pieces and then boiled in lime water along with spices till the water is evaporated. The particles of tobacco left behind are then dried and coloured with saffron or other vegetable dyes. Sometimes the prepared Zarda is mixed with finely cut betelnut and other spices.

The method of manufacturing other higher types of chewing tobaccos, however, is as elaborate as that followed in the preparation of high class hookah tobaccos. Spices and scented waters are liberally used in addition to well-flavoured and thick tobacco leaves. The stalks, mid-ribs and veins of the leaves are first removed and then the leaves are soaked and boiled in water to scented waters, like rose water, may be added. Spices like saffron, cardamom, aniseed and musk are also added in powdered form. The whole mass is then stirred and allowed to digest. The pulpy material is then allowed to dry after straining and removing the remnants of the stalks, mid-ribs and veins of tobacco leaves. The product then assumes the consistency of a thick and rough paste which is known as Qiwam.

In the preparation of pills, the tobacco paste as prepared above, is further dried and the material made into small pills which are then further dried in the shade. When it is not desired to make pills, the material is fully dried and made into a granular paste, sometimes by adding a further amount of finely cut tobacco leaf. The chewing tobacco thus prepared is usually blackish in colour, but sometimes vegetable dyes are used to give it a reddish tinge. The pills and the granules are sometimes coated with gold and silver foils.

PERFUME FOR CIGARS.

143 T.S.R., Palni—Wants a formula for perfuming cigars:—

Cedarwood oil	5	parts.
Geranium oil	2	,,
Patchouli oil	1	part.
Sandal oil	2	parts.
Alcohol	1000	,,

Mix.

AUTOMOBILE WAX PASTE.

204 S.V., Lucknow—Wants to have good formulas and processes of preparing automobile wax paste for fixing labels on tins, marking ink, etc.

A

Carnauba wax	20	pounds.
Beeswax	13	,,
Montan wax	7	,,
Stearic acid	5½	,,

B

Turpentine	7	gallons.
Varnolene	7½	,,
Triethanolamine	2¾	pounds.
Water	7 to 8	gallons.

In a steam-jacketed kettle at 90°C. melt "A" and then add the triethanolamine stirring constantly. Add "B" slowly and then the boiling water. Stir rapidly till the emulsion is formed and then slowly till cold.

PASTE FOR FIXING LABELS ON TINS.

Tragacanth	1	ounce.
Acacia	4	ounces.
Thymol	14	grains.
Glycerine	4	ounces.
Water, sufficient to make	2	pints.

Dissolve the gums in 1 pint of water, strain, and add the glycerine, in which the thymol is suspended; shake well and add sufficient water to make 2 pints. This separates on standing, but a single shake mixes it sufficiently for use.

PASTE FOR FASTENING CELLULOID ON METALS

To attach celluloid to wood, tin and other metals, a mixture of 1 part of shellac, 1 part of spirit of camphor, 3 to 4 parts of alcohol, in which 1 part of camphor is dissolved without heating in 7 parts of spirit of wine, adding 2 parts of water.

BLACK MARKING INK.

Distilled water	40	parts.
Shellac water varnish	15	„
Aniline salt	20	„
Common salt	8	„
Copper chloride	7½	„
Glycerine	½	part.

Add aniline salt to the water, then the ordinary salt and chloride of copper, glycerine and shellac-water varnish. Mix up and strain well.

RADIATOR LEAK STOP.

For quick sealing of small leaks apply the following paste:—

Cellulose lacquer, colourless	10	parts.
Aluminium filings, fine	3	„

Mix.

WOOD BENDING.

246 J.C., Kottayam—Wishes to have a method of wood bending.

There are several processes of bending wood. One of the simple processes is to soak the wood in boiling water for 3 to 6 hours, according to its dryness and thickness. Now bend it into required shape by straps and clamps. When got into position by force, leave it for 24 hours or longer and then keep it aside for another 48 hours before any attempt to work it. Care should be taken to compress the inner curves rather than to stretch the outer ones. The last cut from the lower end of the tree gives the best kind of wood for bending; it should be straight-grained, young, and not too fully seasoned. A simple bend can be made with a rigid iron former, shaped like a link from a chain, or a thick plate of iron having a hole in it through which the piece of wood that has to be bent can be passed. The sides of the hole are bevelled off to soften the abruptness of a right angle, and the ends of the wood are then clamped down to the flat surface of the plate and kept there till the suppleness and elasticity imparted by boiling has disappeared and the wood retains its altered shape.

FISH GLUE

257 B.S., Shahdara—Wants to have a process of preparing fish glue.

Fish glue is principally manufactured in Russia from the bladders of the sturgeon and other fishes belonging to the same family. The bladders, after being placed in hot water, are cut open, washed, and exposed to the air with the inner, silvery skin upward. This is then removed by rubbing, placed in moistened cloth, pressed, and then taken from the cloth and laid either in serpentine windings between 3 small blocks or placed together in sheets like a book and dried.

BRASSING IRON.

260 T.S.P., Bombay—Wishes to have a process of brass coating on small iron articles.

To brass small articles of iron and steel drop them into a quart of water and ½ ounce each of sulphate of copper and protochloride of tin. Stir the articles in this solution until desired colour is obtained.

ICE CREAM.

281 K.P.N., Bombay—Wants to have a recipe of ice cream with milk powder.

Unsalted butter	18	oz.
Skim Milk powder	21	„
Sugar	23	„
Water	6	pints.
Sodium alginate	1	oz.

Heat the butter and water cautiously in a steam pan or sauce pan to 156°F. Add the sugar, skim milk, and alginate and stir for 20 minutes, maintaining the temperature at 156°F the whole time. This will ensure that the alginate and skim milk powder are completely dissolved. Stir thoroughly or preferably homogenize. Cool rapidly to 40°F add the flavouring and colouring agents. Age and freeze.

CALCIUM CARBIDE

313 S.G., Calcutta—Desires to know a process of manufacturing calcium carbide.

Calcium carbide is the only source of obtaining acetylene gas. It is formed by the action of lime upon carbon in the electric furnace.

$$CaO + 2C = CaC + CO$$

Lime carbon carbide carbon monoxide gas.

Since under the conditions of the preparation the carbide is liquid, two possibilities present themselves: (1) it is possible to let the furnace contents solidify at the end of the run; or (2) to run off the liquid carbide from the furnace as it is formed. The furnaces used for the first process are termed ingot furnaces, whilst the second method is carried out by means of tapping furnaces.

One of the most effective types of ingot furnace is that devised by Wilson. The actual furnace is a sheet-iron box about 6 feet high,

mounted on wheels so that it can travel along a railway. The two graphite electrodes are mounted vertically over the line of rails and can be lowered into the box when it is in the proper position. After the contents of one box have been treated, the electrodes are raised; the box is rolled away and another box is brought under the electrodes in its turn. In this way charges can be treated in succession by the same pair of electrodes; and no time is wasted in cooling the product. The furnace charge consists of burnt lime and anthracite or coke crushed to pieces about a quarter of an inch in diameter. Powdered material does not give such good results as granulated particles do. The charge is introduced down shoots and is kept on a level about 2 feet above the arc. It is stirred up at intervals to facilitate the escape of gases. The weight of the charge is about 10 cwt. and from this some 800 lbs. of commercial carbide is obtained.

Other types of ingot furnace have no truck, but instead the bottom of the furnace opens outwards so as to allow the carbide to drop through. There is also the Horry type, in which the rotary principle is employed: so that once the carbide is formed it is removed into a cooler region, by the slow revolution of the furnace, whilst the arc plays upon fresh raw material.

Turning now to the tapping furnaces, these are furnished with a large vertical electrode, about 8 feet long, composed of rods held in a circular holder and having carbon paste rammed into the interstices of the mass. The furnace is permanent, and is provided with a vent through which the molten carbide is drawn off (or "tapped") as it is formed.

The choice of the raw materials for calcium carbide manufacture requires care, as otherwise the process may be dangerous or the resulting product may be contaminated with undesirable matter. The presence of magnesia interferes with the carbide formation; any phosphorous may give rise to phosphoretted hydrogen if the carbide is utilised for the production of acetylene; whilst if the coal used contains much mineral matter the end-product may be of bad quality.

The main commercial application of calcium carbide is the generation of acetylene; but in recent times carbides have been employed in the fixation of nitrogen.

WHEAT STARCH

320 N.F., Bombay—Wishes to have the process of manufacturing wheat starch.

There are two different methods for the manufacture of starch from wheat. The first method employs wheat flour while the latter starts with whole wheat.

The process now easily adopted for working wheaten flour for pure starch is the Sweet Process. The flour is mixed with a small amount of water to a stiff dough, placed in special kneading machine and the excess of water kneaded out. Most of the starch goes into suspension in the water, forming a milk, while the sticky gluten and cellulose fibres remain behind as a thick soft mass. The open kneading machine most used for the process consists of a trough in which two kneading arms are worked in opposite directions, one directly by means of a pulley, and the other indirectly by means of toothed wheels. The wings revolve at different rates, so that no clogging can occur. The starch milk is emptied out of the trough from time to time, the last traces being removed from the remaining gluten by passing the mass through rollers.

The starch milk is separated into pure "prima" starch and glutinous "secondary starch" by centrifuging in special drums, which are non-perforated, the process being exactly the same as described in the manufacture of rice starch. The drying is also carried out as with rice starch, similar fissures making their appearance in the dried mass as in the case with rice starch, the fissured appearance differentiating the valuable wheaten and rice starch from the cheaper potato starch. Even on adding glutinous material to potato starch it is impossible to obtain this fissured appearance.

The gluten-rich secondary starch is either directly used as food (also as cattle food) or is allowed to spontaneously ferment at 50°C., when a further yield of starch is obtainable.

TINTING FILMS

337 S.S.M., Ajmer—Desires to know a good process of tinting films.

Tinting of films may be done by immersing the film in a solution of dye which colours the gelatin, causing the whole to have a uniform veil of colour on the screen. The success in tinting depends on the correct choice of dyes and the correct methods of their application.

The equipment necessary for systematic tinting is essentially the same as that required for development consisting of the usual tanks and racks.

Racks and tanks used with each solution should be kept separate to prevent their contaminating the baths of other solutions.

RED

Amaranth 40°F	10	grams.
Distilled water	2	litres.

Mix and dip the film for 3 minutes. Then take out and put over racks to dry.

SCARLET

Scarlet G. R.	4	grams.
Distilled water	2	litres.

Mix. Dip the film in this solution for 3 minutes and then take out.

LIGHT GREEN

Fast Acid Green B	8	grams.
Distilled water	2	litres.

Mix and dissolve. Dip the film in this bath for 3 minutes and then take out and dry over racks.

—BRIEF QUERIES AND REPLIES

Questions of any kind within the scope of Industry are invited. Enquiries or replies from our experts will be published free of charge in serial order. Questions are replied by post on receipt of As. 8 stamps for each question. Subscribers outside India are requested to send two International Reply coupons for each question. In order to facilitate the work of Editor's Department and to help prompt action the readers are requested to send enquiries in separate letters.

910 B.I.W., Poona—Following is a formula of incense· Siamese benzoin 150 parts; sandalwood in powder 300 parts, cascarilla in powder 150 parts willow charcoal 120 parts; saltpetre 30 parts; cardamom in powder 40 parts; cubebs in powder 35 parts; myrrh 10 parts, grain musk 5 parts, bergamot oil 30 parts, patchouli oil 10 parts; neroli oil 20 parts; cassia oil 15 parts; clove oil 5 parts; peru balsam 30 parts, orris root 10 parts, isobutyl cinnamate 30 parts; methylo ionone 10 parts. Mix and form into cakes.

911 M M S., Delhi—Following is a formula of D. D. T. lotion or spray. D. D. T. powders 8 oz, paraffin oil 1 gallon; encalyptus oil 1 oz, petrol ¼ gallon. Macerate the D. D. T. powder in paraffin oil for 48 hours strain and add the other ingredients.

912 N G.L., Calcutta—Following is a list of iron foundries Ballygunge Engineering Works 33-11, Kankulia Road, Ballygunge, Bengal Light Casting Co, Ltd., 21, Maharshi Debendra Road; Indian Iron & Steel Co., Ltd., 12, Mission Row; Kushumika Iron Works Ltd., 3, Maharshi Debendra Road, Metal Manufacturing Co., 32, Armenian Street and Ram Krishna Iron Works Ltd., 58, Netaji Subhas Road; all of Calcutta. An exhaustive list will be found in Industry Year Book and Directory published from this office, price Rs. 16-4 including postage.

913 K.V.S R, Perala—For mantle knitting machines enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta.

914 G I M.S, Deoli—Process of making colours and enamel paints will appear in formula section in due course.

915 R. R. T, Hoshiarpur—You should use distilling plant for extracting rosin oil from oleoresin.

916 B. B., Burdwan—To blue gun-barrels, etc dissolve 2 parts of crystallized chloride of iron; 2 parts solid chloride of antimony, 1 part gallic acid in 4 or 5 parts of water; apply with a small sponge and let dry in the air. Repeat this two or three times, then wash with water and dry. Rub with boiled linseed oil to deepen the shade. Repeat this until satisfied with the result Following is a formula of browning: Spirits of wine 1½ oz; tincture of iron 1½ oz; corrosive sublimate 1½ oz; sweet spirits of nitre 1½ oz; blue vitriol 1 oz; nitric acid ¾ oz. Mix and dissolve in 1 quart of warm water and keep in a glass jar. Clean the barrel well with caustic solution to remove grease or oil. Then clean the surface of all stains and marks with emery paper or cloth so as to produce an even bright surface for the acid to act upon, and one without finger marks. Stop the bore and vent with wooden plugs. Then apply the mixture to every part with a sponge or rag, and expose to the air for 24 hours, when the loose rust should be rubbed off with a steel scratch brush. Use the mixture and the scratch brush twice and more if necessary and finally wash in boiling water, dry quickly and wipe with linseed oil or varnish with shellac

917 S. X., Baroda—We have no book on radio crystal set manufacture You may however enquire of Thacker Spink & Co (1933), Ltd., 3, Esplanade East, Calcutta for the book required.

918 E. E. T. C., Bombay—Process of medicated cream will appear in Formula section in due course.

919 S D. S., Saharanpur—Your enquiry is in the nature of an advertisement, so this cannot be published in these columns. You better advertise in newspapers.

920 W.K.T.C., Rangoon—An article on tablet making appeared in June 1950 issue of Industry which you may consult with advantage.

922 F.M A.C., Lucknow—For plastic machines enquire of Francis Klein & Co, Ltd, 1, Royal Exchange Place, Calcutta; Alfred Herbert (India), Ltd., 13-3 Strand Road, Calcutta, and Vulcan Machine & Tool Co., 66, Manicktola Main Road, Calcutta. For the machines you require enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension; Francis Klein & Co. Ltd, 1, Royal Exchange Place, Marshall Sons & Co. Ltd, 99, Netaji Subhas Road; Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road, and T E Thomson & Co., Ltd., 9, Esplanade East; all of Calcutta.

924 C. T. A., Amritsar—Collapsible tubes may be had of Metal Box Co of India Ltd., B2, Hide Road, Kidderpur, Calcutta.

925 T. S. R., Ellore—Process of manufacturing rosin, turpentine and shellac will appear in Formula section in due course.

926 I. U. I., Bombay—Following is a formula of chalk crayons: Plaster of Paris 2 parts,

precipitated chalk 1 part; china clay 1 part; water q.s. Mix ingredients thoroughly, then add sufficient quantity of water to make it clayey mass. Now pour in mould and when dry bake over slow fire.

927 M. V. M., Udipi—Tablet making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta and Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. Safetypin making machine is not available in India at present. For nib making machines enquire of Alfred Herbert (India) Ltd., 13-3, Strand Road, Calcutta.

928 D. T. D., Patna—Process of manufacturing vinegar, synthetic lemon squash, etc. will appear in Formula section in due course.

929 S. D. B., Jowai—For paper and exercise books enquire of the following firms:—A. C. Paul, 68, Vivekananda Road; A. K. Begwani and Sons, 2-1, Synagogue Street; Calcutta Paper Supply Co., 26, Amherst Street and Gopinath Pal & Co., 109, Old China Bazar Street; all of Calcutta.

930 D. G. R., Kotagiri—All the raw materials and chemicals you require may be had of Calcutta Mineral Supply Co. Ltd., 31, Jackson Lane; Calcutta Chemical Co. Ltd., 10, Bonfield Lane and Banshidhar Dutt, 126, Khengrapatty Street; all of Calcutta. For pencils enquire of Stationery Emporium, 1, Armenian Street, G. T. Madras; Madras Stationery Mart, Leans Square, Madras; Times Stationery Co., 9, Armenian Street, Madras and Office Equipment Co., 2, Armenian Street, Madras. Process of deodorising coconut oil will be found in May 1949 issue of Industry.

932 M. M. V., Bhavnagar—We have no book on typewriter repairing. You may enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta and W. Newman & Co. Ltd., 3, Old Court House Street, Calcutta for the book required.

933 F. C., Modinagar—Wants to be put in touch with the manufacturers of lamp black, ivory black, bone black, acetic acid and carnauba wax substitute. Wants to be put in touch with shoe material importers of Bombay and Calcutta.

934 R. L. M., Ludhiana—All the machines you require may be had of Baird Machinery Co., Bridgeport, Connecticut, U. S. A. These machines are not available in India at present. Process of manufacturing chalk crayons will be found in Prospective Industries published from this office, price Rs. 3-7 including postage. Penholder making machines may be had of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta.

935 H.K., New Jatoi—Sugar candy is prepared from a saturated solution of sugar, formed by adding sugar to boiling water till it dissolves no more. The solution is then run into troughs, in which it is allowed to cool slowly while a number of threads are hung in the liquid upon which the crystals form, and continue to grow. The time required will depend on the bulk of sugar treated. In working on a small scale, it will be necessary to remove the strings and adhering crystals, then add more sugar to the liquid, boil up, and immerse the strings again while the liquid is cooling. Cakes of candy will also separate on the sides of the vessel in which the liquid cools.

936 B. B. A., Peddapuram—All the raw materials required may be had of Banshidhar Dutt, 126, Khengrapatty Street, Calcutta.

937 C. L., Palakol—Wash the hair with soap to remove oil and grease. Now apply the hair dye. Henna leaves may be had of Banshidhar Dutt, 126, Khengrapatty Street, Calcutta.

938 R. N. B., Poona City—Groundnut oil mills are situated at Madras and in almost all the districts of Madras Presidency. Following is a list of a few oil mills: Mogili Oil Mills, 15, Chinnathambi Mudali Street, Madras; Sudarsan Oil Mills Ltd., 275, Linghi Chetty Street, Madras-1; Jamal Mills, Amdalvalsa, Vizagapatam, Mohan Groundnut Factory & Oil Mills, Dharmavaram, Anantapur; Prabhakar Oil Mills, Vizianagram, Vizagaptam and Sri Krishna Oil Mills, Negapatam.

939 H. V. B., Indore—Match chemicals may be had of Allied Agency, 16, Bonfield Lane, Calcutta. Match making machines may be had of Standard Machinery Co., 86B, Netaji Subhas Road, Calcutta and Harima Engineering Works Ltd., 69-1, Belgachia Road, Calcutta.

940 G. R. L., Bombay—For plastic tape enquire of Popular Plastics, Ruby House, Opp. Colaba Tram Terminus, Bombay 5 and Orient Import & Export Agency, 52, Shri Krishna Nivas, New Silk Bazar, Kalbadevi Road, Bombay.

941 V. S. B., Delhi—You should go to Japan and learn the industries practically.

942 P. V. S. R., Madras—Envelope making machines may be had of Oriental Machinery Supplying Agency Ltd, P12, Mission Row Extension, Calcutta.

943 M. R. B, Bijapur—Process of manufacturing saccharine appeared in August 1949 issue of Industry.

952 J. T. M., Surat—Following is a list of litho and offset printers: Bharat Laxmi Press, 92, Princess Street; Bolton Fine Art Litho Works, Tardeo; Bombay Fine Art Offset & Litho Works, Sussex Road, Victoria Gardens; Premier Offset Works, Swadeshi Mills Estate,

Girgaon and Ravi Udaya Vijay Photo Litho Offset Works, Tilak Road, Ghatkopar; all of Bombay.

953 T. R., Chingleput—For securing an expert in manufacturing confectionery advertise in local daily papers. Moulds, etc. may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta-4.

954 K. R., Bhimavaram—For Landsam blade enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension; Alfred Herbert (India), Ltd., 13-3, Strand Road; Francis Klein & Co. Ltd., 1, Royal Exchange Place and T. E. Thomson & Co. Ltd., 9, Esplanade East; all of Calcutta.

955 A. C., Salur—You may consult Manures and Their Application published from this office, price Rs. 2-7 including postage. For bone disintegrating machine enquire of Marshall Sons & Co. Ltd., 99, Netaji Subhas Road, Calcutta and Alfred Herbert (India), Ltd., 13-3, Strand Road, Calcutta.

956 T. S. R., Ellore—Process of manufacturing colophony, glycerin, etc. will appear in Formula section in due course.

957 D. J., Tindivanam—Refer your query to American Trade Commissioner, 9-10, Esplanade Mansion, Calcutta.

958 A. S., Saharanpur—The prospects of biri making are very good. The industry can be started with a small capital and skilful labour is not also required. A little practice will enable even a novice to make good biris and quickly too in a few days. The raw materials for biri making industry are too well known to require detailed mention. The chief ingredients are (1) the tobacco mixture which will serve as filler and (2) the wrapper leaf. The filler tobacco and the wrapper may be had of Bhailal Bhikhabhai & Co., 99-2, Lower Chitpur Road and Mooljee Sicka & Co., 57, Ezra Street; both of Calcutta.

959 M. M H, Olavakot—For grinding machine enquire of Marshall Sons & Co. Ltd., 99, Netaji Subhas Road; Alfred Herbert (India) Ltd., 13-3, Strand Road; both of Calcutta. Collapsible tubes may be had of Metal Box Co. of India Ltd., B2, Hide Road, Kidderpore, Calcutta.

961 M. A. C. S., Nigeria—Sample sent by you is of mica. And the mica is of superior quality. Mica is exported from India, so you cannot find market for mica in India.

962 K. V. S. R., Perala—Secondhand mantle knitting machine is not available. For new machines enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta.

964 D. P. S., Lucknow—Refer your query to the Controller of Exports, New Delhi.

965 D. A. S., Ratnagiri—You may start a soap factory with Rs. 5,000/- on a small scale.

966 K. B. R., Vizianagram—For corks write to Fital Cork Co., 153-1, Radha Bazar Street and S. P. Singha & Co., 67, Ezra Street; both of Calcutta. For tin cans enquire of Tin Supply Co., 1688, Khadia Jalawali Naka, Ahmedabad; Weldon Tin Works, Vadgadi, Mandvi, Bombay; Saify Tin Factory, Upper Duncan Road, Bombay; New Fakhri Tin Factory, 97, Dongri Street, Bombay and N. A. G. Tin Factory, Ghaffer Bldg., King Edward Road, Suree, Bombay. For labels write to Bharat Laxmi Press, 92, Princess Street, Bombay 2 and National Art Service, Bell Bldg., Sir Pherozshah Mehta Road, Bombay. Following is a list of Glass Works:—Jamal Glass Works, Tondiarpet, Madras; Madras Glass Works Ltd., 16, Cochrane Basin Road, Madras and Mysore Glass & Enamel Works Ltd., 34, Gandhinagar, Bangalore City.

967 F. M. A. C., Lucknow—As far as we know bakelite powder is not manufactured in India at present.

968 J. M. S., Ahmedabad—For strawboard making machines write to Francis Klein & Co. Ltd., 1, Royal Exchange Place; Marshall Sons & Co. Ltd., 99, Netaji Subhas Road and Jessop & Co. Ltd., 93, Netaji Subhas Road; all of Calcutta.

969 K. K., Alleppey—You may use decorticating machine for which write to Batliboi & Co., Forbes Street, Fort, Bombay.

970 T. S. R., Ellore—Process of manufacturing starch, glucose, etc., will appear in Formula section in due course.

995 S. C. S., Surat—Following is a formula of white shoe cleaner. White clay 16 oz; spanish whiting 8 oz.; flake white 6 oz.; precipitated chalk 4 oz.; powdered tragacanth 2 oz.; carbolic acid 2 dr.; ultramarine blue 1 dr. Mix the powders and knead with water. Divide the paste into small pellets and cast each into suitable mould. Following is a formula of liquid white shoe cleaner· Lithopone 3 lbs.; glue 2 lbs ; soap powder 2 oz.; oxalic acid 2 oz.; water 2 gallons. Soak the glue in the water until soft, then heat up until completely dissolved, next add soap and acid, then lithopone. Stir up, and when creamy strain and bottle.

1007 K. A. R., Larkana—You may consult Free Lance by R. Dhara and Journalism by R. Dhara; both the books published from this office.

1008 H. P., Sri Govindpur—Japanese addresses are not available at present.

1009 S. J., No address—Please write in English.

1010 D. R. C., Cachar—For saccharin enquire of B. K. Paul & Co. Ltd., 1 & 3 Bonfield

Lane; Calcutta Chemical Co., Ltd., 10, Bonfield Lane and Allied Agency, 16, Bonfield Lane; all of Calcutta.

1011 B. D. B., Shillong—You may consult directories and collect addresses. Now you should correspond with the parties describing the nature of your business.

1012 J. P. S. B, Katmandu– Wants to be put in touch with the agents of Alexander Sewing thread Playing cards may be had of S. A. Leonard Biermans, 13-1A Govt. Place East, Calcutta and W. Newman & Co. Ltd., 3 & 4 Old Court House Street, Calcutta Candle sticks may be had of Dipak Candle Manufacturing Co., 375, Upper Chitpur Road, Rupali Candle Works, 9, Mondal Street and United Manufacturers and Traders, 7, Hanspuker Lane; all of Calcutta.

1013 S. V. P., Singapore—You may consult Electroplating in Practice published from this office price Rs. 3-7 including postage.

1014 M. S., Cuttack—For milk powder enquire of Nestle's Products (India) Ltd., 7, Hare Street, Calcutta. Wants to be put in touch with the agents of Huntley Palmer's biscuits and Ovaltine biscuits.

1015 P. R. C., Jaipur—Sheet metal working machines may be had of Alfred Herbert (India), Ltd., 13-3, Strand Road and Francis Klein & Co. Ltd., 1, Royal Exchange Place; both of Calcutta. Tin printing ink may be had of Ganges Printing Ink Factory Ltd., 14, Netaji Subhas Road; Coates Brothers & Co. Ltd., 22, Strand Road; John Dickinson & Co., 6, Clive Row; all of Calcutta.

1016 B. M. S., Ankleshwar—For books on handwriting detection enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta. Following is a list of litho-printers: Bombay Fine Art Offset & Litho Works, Sussex Road, Victoria Gardens, Bombay 27; D. C. Chunder & Co., 42-1, Bow Bazar St., Calcutta; Imperial Art Cottage, 1A, Tagore Castle Street, Calcutta and Litho Type Works, Advani Chambers, Sir P. Mehta Road Bombay For enamel boards write to Delhi Enamel Works Ltd., Sadar Bazar, Delhi; Sur Enamel & Stamping Works Ltd., 9, Middle Road, Entally, Calcutta and Bombay Enamel Works Ltd, 104, Sion Matunga Estate, Bombay 22. Address of the Consul General for U.S.A. is Construction House, Nicol Road, Ballard Estate Bombay Address of the Consul-General for Switzerland is 125 Esplanade Road, Fort, Bombay Address of the Consul for France is Clandine, 87B, Nepean Sea Road, Bombay. Address of U. K. Trade Commissioner in India is Menkia Bldg., 16, ... Road, Fort, Bombay. Formulas you require will appear in Formula section in due course.

1017 B. O., Banai Garh—For crude drugs enquire of Banga-Laxmi Ayurved Works, 31, Clive Row; Indian Herb Store, 31, Mullick Street and Banshidhar Dutt, 126, Khangrapatty Street; all of Calcutta. For soldering appliances enquire of Alfred Herbert (India) Ltd., 13-3, Strand Road, Calcutta.

1018 J. W. E., Nagpur—Following is a formula of casehardening compound: Sodium Cyanide 45,90 oz.; barium chloride 31.1 oz.; sodium fluoride 12.4 oz; calcium fluoride 7.3 oz. This fuses at about 600°C.

1019 K. B. R., Vizianagram—Formulas of rubber stamp ink and bottle capping solution will appear in Formula section in due course.

1020 K. M., Mymensingh—For trade mark registration you may negotiate with the following firms: A. Mitra & Co., 5-2F, Raja Rajballav Street and Dutta & Co, 82, Harrison Road; both of Calcutta.

1021 P. S. P, Gobichettypalyam—To convert inferior sugar including the second sugar into refined crystalline white sugar, it is boiled with water and the syrup is clarified with milk till a perfectly clear syrup is obtained, which is then concentrated by continued boiling till the right consistency is attained. When ready to crystallise, the syrup is thinner than that of the canejuice rab and the state is easily determined by the experienced eye of the boiler. The hot liquid transferred into a round iron pan in which it is aired in order to favour crystallisation; as soon as the fine crystals become visible the mass is transferred to suitable vessels to cool and crystallise further. After two or three days to crystallise the material is ready to be treated in the centrifugal. The sugar mass tipped into a enamelled basin or brass or copper vessel, the hard lumps are broken with a wooden pug unless there is a pug mill for that operation, and put into the basket of the centrifugal, mixed, if necessary, with syrup eliminated from a previous charge to facilitate the machinery. It is only necessary to wash this sugar very sparingly with water injected by the syringe into the basket of the centrifugal machine.

1022 V. C. T., Wattala—For labels of all kinds enquire of R. G. Pal & Co., 110-2, Grey Street, Calcutta.

1023 R. S., Muzaffarpur—Following is a list of rubber balloon manufacturers:—Aero

Rubber Works, Kottayam, Travancore; Balchu Rubber Industry, Itwari Station, Nagpur; Bombay Rubber Co., 426, Kalbadevi Road, Bombay; Empire Rubber Works, Surjulag Mill Compound, Tardeo, Bombay; Gandhi Industries, 272, Musjid Bunder Road, Bombay 3 and Oriental Rubber Industries, Dhurampet, Nagpur. Wants to be put in touch with the manufacturers of transfer pictures.

1024 V. P. G., Banaras—For selling spray bottles you should advertise in newspapers.

1025 K. V. R., Khurda Road—It is not possible to start a rice mill with Rs. 10,000. You may use huller for rice hulling. You may enquire of Marshall Sons & Co. Ltd., 99, Netaji Subhas Road, Calcutta. You may start a soap factory with Rs. 5000/- on a small scale.

1026 B. S. M. S., Vizagapatam—Following is a formula of chalk crayon: Precipitated chalk 40 parts; Plaster of Paris 45 parts; lithopone 10 parts; glue solution 5.10 parts. Knead all together to make soft dough and pour into gun metal moulds. When set take out and allow to dry in air. Then put all together in a tray and moderately bake over mild fire. All the ingredients may be had of Calcutta Mineral Supply Co. Ltd., 31, Jackson Lane, Calcutta.

1027 M. M. A., Kanpur—Following is a formula of face powder: Rice starch 7½ lbs.; maize starch 2½ lbs; talc 1 lb; zinc oxide 10 oz.; carmine 2 oz.; otto of rose 3 oz.; otto of khus khus 3 oz.; sandal oil 3 oz. Mix.

1028 I. S. S. R., Meerut Cantt.—You may consult Manures and Their Application published from this office, price Rs. 2-7 including postage.

1029 I. P. W., Azamgarh—You may consult Safety Matches and Their Manufacture published from this office, price Rs. 5-8 including postage. Match making machines may be had of Standard Machinery Co., 86-B, Netaji Subhas Road and Harima Engineering Works, 69-1, Belgachia Road, both of Calcutta.

1030 P. G. M., Kaimganj—You may start fishery and poultry with Rs. 10,000/- as initial capital. As regards rice mill and oil mill you may start with Rs. 50,000/-.

1031 P. K. D., Barpeta—Envelope making machines may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. We have no such dictionary.

1032 T.P.K., Ahmednagar—For rope making machines enquire ot Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta.

1033 C. A. Nizamabad—Your letter has already been redirected.

1034 R. N. U., Etawah—All the chemicals you require may be had of Calcutta Chemical Co., Ltd., 10, Bonfield Lane and Calcutta Mineral Supply Co. Ltd., 31, Jackson Lane; both of Calcutta.

1035 C. I. L., Delhi—Wants to be put in touch with the importers of Ceylon graphite in India. For rubber erasers enquire of Bengal Waterproof Works (1940) Ltd., 32, Theatre Road, Calcutta; Modern Rubber Industries, Sonya Maruti Chowk, Laxmi Road, Bombay 2 and National Rubber Manufacturing Co., Tiruvalla, Travancore.

1051 K. S., Kadur—You may start ink manufacture, sealing wax manufacture and phenyle manufacture on a small scale in your place. Process will be found in April 1950 issue of Industry.

1052 G. C. M., Delhi—Process of manufacturing glue appears in June 1950 issue of Industry. It is not possible to manufacture liquid hair dye which may be mixed with hair oil and used.

1053 J. K. M., Kanpur—All the chemicals may be had of Calcutta Chemiical Co. Ltd., 10, Bonfield Lane and Fuzlehussein & Bros., 44, Armenian Street; both of Calcutta.

1054 T. V. C., Guntur—An article on candle manufacture appeared in April, 1950 issue of Industry.

1055 A. C. C. C., Udaipur—We have no arrangement for imparting practical training on toilet preparations. You may however write to P. C. Bhattacherjee, 16-1, Nandalal Bose Lane, Calcutta 3, for practical training on toilet preparation

1057 I A. K., Dhrapha—Process of block making will be found in Independent Careers for the Young published from this office, price Rs. 3-7 including postage. Process of manufacturing hair oil will be found in April 1950 issue of Industry.

1058 M. G. G., Gurdaspur—We cannot understand why the formula of magic serpent failed. We are not aware of any other formula. You may try to experiment the formula with the help of a chemist.

1059 P. V. R., Koruprolu—You may start rubber goods manufacture. There is no arrangement for giving practical training on rubber goods manufacture.

1060 S. V., Lucknow—No adhesive is applied to cork sheets for fixing it to crown corks.

1061 A. M. C., Calcutta—For almond oil extracting machine enquire of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta.

1062 U. I. E. C., Colombo—For cardboard box making machines enquire of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta and John Dickinson & Co., 6, Clive Row, Calcutta.

1063 D. P. S., Eluru—For metal printing on cloth two methods are in vogue viz., varnish method and mica printing method. The varnish method is generally used. Copal varnish is generally used. Ordinary white lead is added to a sufficient quantity of varnish to get a paste like thing. Wooden blocks are of no use. The designs are cut in thin sheets of tin or copper. Place the tin sheet on the cloth and with a knife spread the paste on the sheet and then scrape it. The paste enters through the designs cut in the sheet and sticks to the cloth. Small leaves of gold are spread over When the paste is hardened brush tightly Only the leaves sticking to the paste will remain.

1065 H. C., Saharanpur—It is not possible to supply you a list of chemists and druggist in these columns. You better consult Industry Year Book and Directory published from this office, price Rs 16 4 including postage.

1066 M. A. S., Dhulia—Dry battery making chemicals may be had of Calcutta Mineral Supply Co Ltd., 31, Jackson Lane, Calcutta. For machine enquire of International Trading Co., 14, Netaji Subhas Road, Calcutta.

1067 J. D. C., Keonghargarh—For rubber shoes enquire of Bata Shoe Co. Ltd., Batanagar, 24 Parganas; Bhattacharya Rubber Works, 174, Jessore Road, Dum Dum, Near Calcutta and Imperial Rubber Works, 10, Paymental Garden Lane, Calcutta Umbrellas may be had of Mohendra Lall Dutt & Sons, 49B, Harrison Road; Nundo Lall Paul & Co, 125, 126, Old China Bazar Street and Sohanlal Mohanlal Ltd., 5, Lucas Lane, all of Calcutta

1069 A. H S., Trichur—Crude drugs may be had of Banshidhar Dutt, 126, Khengrapatty Street and P. C. Dawn & Co, 1, Mechua Bazar Street; both of Calcutta. Collapsible tubes may be had of Metal Box Co. of India Ltd., B2, Hide Road, Kidderpur, Calcutta

1070 G. D, Allahabad Failure in soap manufacture is due to adulteration of linseed oil used. If you use pure linseed oil you will be successful You may also try with groundnut oil. You may consult Manufacture of Soap published from this office, price Rs 4 7 including postage. Reduce the proportion of caustic soda which should not be more than 3 seers.

1071 B. I. S. W, Bahjoi—For cardboard write to India Paper & Board Mills Ltd, 71, Satgachi Road, Dum Dum, near Calcutta; Mullick & Co., 82, Harrison Road, Calcutta and D. J. Banerjee, 86B, Netaji Subhas Road, Calcutta. For packing paper enquire of J. N. Chatterjee & Brothers, 28-19, Old China Bazar Street and John Dickinson & Co., 6, Clive Row; both of Calcutta.

1072 B. L. M, Calcutta—For plastic goods manufacturing machine enquire of Francis Klein & Co. Ltd., 1, Royal Exchange Place and Alfred Herbert (India) Ltd., 13-3, Strand Road both of Calcutta You may use methylated spirit for polishing spectacles frames. For embossing machines enquire of International Industry Ltd., Aligarh.

1073 J. F. R. M., Lakhimpur—Cot weaving machines are not available. For dal making machines write to Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road, Calcutta.

1074 H. R B. S, Ambala Cantt.—For rubber enquire of the following firms: Pallivathukab, Estates, Negapatam, Kottayam; T. V. Kochuvareed, Planter, Trichur; Southern India Rubber Co. Ltd, Palparai, Coimbatore and Pudukad Rubber Co. Ltd, Palapolly, Nellayi.

1075 E. B. D, Agra—Book binding materials may be had of Calcutta Stationery Supply Co, 47, Bitakkhana Road; Solimuddin Arshed Kazi, 99, Baitakkhana Road and M. Basu Thakur & Co, 87, Old China Bazar Street; all Calcutta.

1076 N T X, Champakulam—We have no book on lithoprinting. You may however enquire of Thacker Spink & Co (1933) Ltd., 3, Esplanade East, Calcutta For lithoprinting machine enquire of John Dickinson & Co., 6, Clive Row, Calcutta.

1077 B F. P, Jullundur City—You may consult All About Fruits published from this office. For preserving fruit products you should use benzoic acid, sodium metabisulphite, salicylic acid, etc.

1078 E. C I, Ludhiana—For books on grease and bleaching powder manufacture enquire of Thacker Spink & Co. (1933) Ltd, 3, Esplanade East, Calcutta.

1079 S. D, Jowai—For flint paper you may enquire of Bholanath Paper House Ltd., Kusum Smriti, 21, Beadon Street; Raghunath Dutt & Sons Ltd, 33 2, Beadon Street; Mukherjee Dutt & Co., 31, Jackson Lane and P. C. Kundu & Co., 136, Old China Bazar Street; all of Calcutta. Wants to be put in touch with dealers in imitation coral beads. Confectioneries may be had of B C. Datta, 71, Canning Street; G. S. Emporium Ltd., 47A, Chittaranjan Avenue; U. P. Confectionery, 71-1, Canning Street and Empire Confectionery Co, 157A, Dharamtala Street; all of Calcutta.

1080 B. S. A, Hubli—You may consult Pharmaceutical Preparations published from this office.

1091 A. A. G., Dhrapha—Yes, you may add 4 lbs. water to 1 lb. stearic acid for manufacturing sugar Camera may be had of Camera House, 131, Girgaum Road and Central Camera Co. & Studio, Saheb Bldg.. 195, Hornby Road; both of Bombay. Activated charcoal and ordinary charcoal are not one and the same thing.

—REVIEW OF BOOKS

CURRENT ECONOMIC PROBLEMS by R. ', Rao, M.A., Ph.D. Published by Kitabmahal, Allahabad. Pages 150, price, Rs. 2/8/-.

The book is a knowledgeable study of some f the economic problems now facing our coun- ry and the solution of which is essential if we eally intend to lend meaning to our present tatus of political independence. The author as no marked leanings towards villagism nor n the other hand does he want to copy occi- lental methods blindly without taking into ac- ount their suitability in regard to conditions peculiar to our economy.

Much stress has been laid in the book on he need to liquidate shortage of food and other primary necessaries. In order to rehabilitate our agriculture we shall have to resort to im- proved productional methods and make provi- sion for better irrigational facilities. Dr. Rao suggests that we shall do well to utilise our iver resources by taking lessons from the T. V. A He attacks the zamindari system, but points out that while abolishing the evil "the Government should pursue a middle course at once ensuring justice and fair play to the dis- possessed and benefit to the State and peasant". The author realizes that the abolition of zamin- dari by itself cannot solve the task of land re- form. An equally important duty is to prevent sub-division and fragmentation of holding and for this the laws of inheritance need to be re formed.

The author advocates prohibition and he thinks that it will release purchasing power for expenditure on necessaries and comforts. He condemns the strike epidemic but urges a sym- pathetic consideration of the cases that breed it. The author attributes much of the present labour unrest to deplorable housing conditions and points out that a comprehensive housing programme is the greatest need of the time He is of the opinion that our tariff policy should be protectionist at least in the beginning and that we should give up the policy of discriminating protection. The author wants that there should be a social security plan in India which should guarantee minimum income to buy essentials of life when one is prepared to work or when one is prevented from working for unavoidable reasons.

The book contains a few important sugges- tions for promoting increased trade relations between India and other countries Prof. Rao is not opposed to controls as such but he wants them to be administered effectively and effi- ciently. He is an advocate of mixed economy under which system State and private enter- prises should reside together. There is a ten- dency these days among our industrialists to look for technical and other help from out- side and to think that if these aids in machinery and technical know-how are not readily avail- able we can hardly succeed in keying up the work of our national economic development. The author discourages this kind of defeatism and urges greater reliance on our own resources. As most sensible persons think, we should start the work of economic reconstruction with what- ever resources we can lay our hands upon and afterwards when we have made some progress other nations may find it advantageous to them- selves to overcome their diffidence and be will- ing to give us the help we have been asking for.

THE INDIAN CITIZEN HIS RIGHTS AND DUTIES by V. S Srinivasa Sastri. Published by Hind Kitabs Limited, 261-263, Hornby Road, Bombay. Pages, 87, price, Re. 1-8.

The book is a timely reprint of the late Mr. Sastri's Kamala Lectures delivered in 1926 under the auspices of the Calcutta University. We call it timely because the subject discussed in these lectures has acquired new meaning and importance in our eyes after the attainment of independence the first visible manifestation of which is that Indians have framed their own Constitution which was proclaimed on January 26 this year.

It may sound something like a panegyric to say that even though Mr. Sastri delivered his lectures more than two decades ago, they have lost none of their interest and value to the modern readers That is so because the author deals more with the *Universal* than with the *Particular*. He deals with the funda- mentals of citizenship in a democratic society, that is, a society in which the individual citizen retains his own unique position and is not, as in a totalitarian state, made to subs- cribe merely to dictates and urgencies super- imposed on him by those who happen to rule the country.

It will be wrong to think that in a demo- cratic society the individual citizen can have the right to enjoy unchartered liberty. It is the duty of the State to confer certain rights on its citizens which they will exercise within

certain judicious limitations and in a manner compatible with the well-being of the State. In a democratic society the citizens should remember that for every right they enjoy they have a corresponding duty towards the State. These days people talk more of the rights of citizenship than of its duties. Mr. Sastri stresses both simultaneously as rights and duties are interlinked. It is not possible to have the one to the total exclusion of the other and a State which either reduces its citizens to serfdom or allows them anarchic freedom, can hardly exist for long.

By democracy Mr. Sastri rightly means the Rule of Law. He abhors the authoritarian bearing of the executive and its anti-democratic methods of interfering with the administration of justice. Dealing with this rather chronic malady of the previous British regime Mr. Sastri wrote 24 years ago, "Whatever may have been the course of legislation and public administration in India so far, in future we must be on our guard against putting more power into the hands of the executive. We must not pass laws banning our courts from jurisdiction and saying no court shall take cognizance of action arising out of administrative acts." Twentyfour years ago Mr. Sastri alleged that there were too many irksome provisions in our legislation. But even to-day in the post-transfer-of-power period the situation on the civil liberties front has not improved at all and the executive's grip on the judiciary has been tightened further.

Mr. Sastri does not deny to the individual the right to resist the State, but this is not a legal but moral right To the law-breaker he would say: "I recognize there are situations in which one has the right to break the law, but please remember that there are others less law-abiding than yourself who will use your precedent and make the extreme medicine of the Constitution its daily bread." It is the duty of a citizen to bear in mind that as a social being he has no right to act as he pleases, for his actions can and do affect the the well-being of his fellow citizens.

Mr. Sastri decries communalism and its ruinous spirit. He says that "it is no use conferring upon people the right to vote, honorary offices, avenues for public distinction, if they will prefer sectional to the universal, if they will be loyal only to their religion, or to their community, and not loyal to the State to which they owe everything." Minorities in India and Pakistan should take note of these words.

NOTICES & REVIEWS

(Manufacturers sending specimens and samples of their products for notice and review may please note that no notice is published of medical preparations and allied substances in this section.)

SCENTED VERMILION

We hape received samples of scented vermilion from Drolia Sindur Factory, Lakhmisarai, E. I. Ry. Their products are satisfactory.

MOSQUITO REPELLENT

We have received from "Usha" Industries, Davangere, Mysore State a sample packet of "Quilot" mosquito repellent, which is claimed to keep off mosquitoes while burning.

HANDBOOK ON PRESERVING EYE

We have received a copy of "Good Eyes for Life" by Dr. K. M. Agarwal. This small handbook gives briefly several novel plans of preserving eyesight and restoring normal vision without glasses. It is published by Krishna Eye Clinic, 28, Abbott Road, Lucknow.

WALL CALENDAR (IN BENGALI)

We have received from Eastern Type Foundry & Oriental Printing Works Ltd., 18, Brindaban Bysack Street, Calcutta one wall calendar in Bengali.

TRADE ENQUIRIES

(To communicate with any party write to him direct with name and address given below mentioning Industry).

882 P. A. Abdul Ali, Mohamed Ali Bazar, Tirupattur, N. A.—Wants to be put in touch with retail snuff dealers of Calcutta, Bombay and Delhi and retail beedi dealers of Bombay and Delhi.

1068 C. Rangilah Raju, 160, Govindappa Naick Street, Madras—Wants to be put in touch with the wholesale dealers of herbs and drugs in Cochin and Travancore.

1117 East India Leather Co., Thirumullaivoyal Avadi, Madras—Want to be put in touch with the suppliers of wet salted crocodile skins, yellow and black lizard skins, water lizard skins, dhamin snake, cobra and python snake skins.

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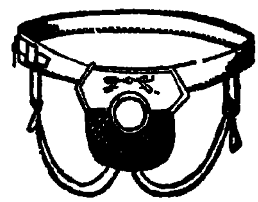
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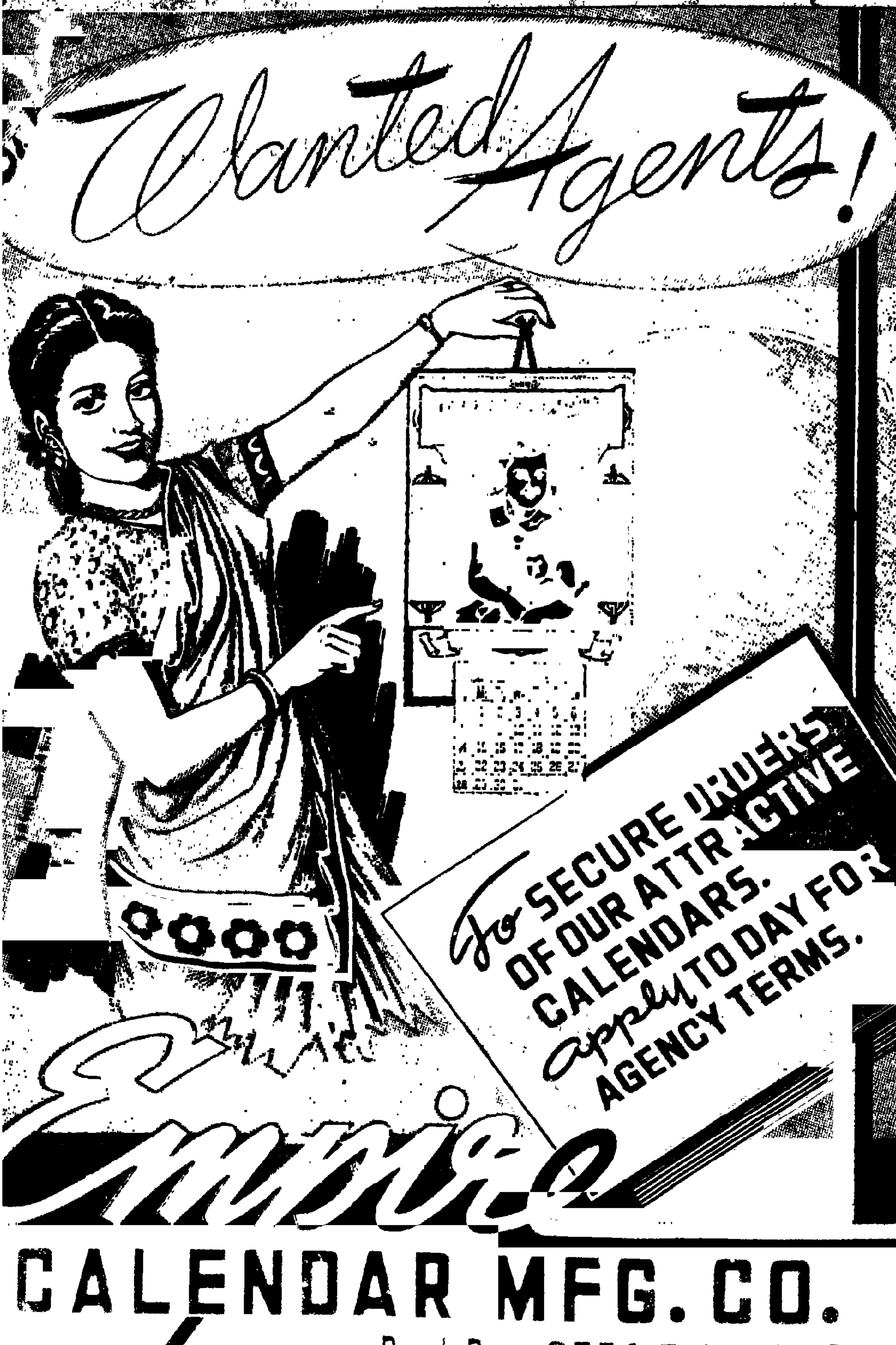
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VOL. XLI. CALCUTTA, AUGUST, 1950. No. [illegible].

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EDITORIAL CONTENTS FOR AUGUST, 1956.

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All enquiries regarding the Subscription or Advertisement Departments should be addressed to the General Manager.

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Editorial Department — 11 A.M. to 4 P.M. on weekdays and 11 A.M. to 2 P.M. on Saturdays.

Subscription and Advertisement Department, 10 A.M. to 5 P.M. on weekdays and 10 A.M. to 1 P.M. on Saturdays.

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Book Binding Materials
Books & Periodicals
Bottles & Corks
Brass Component
Brushes
Button & Ivory
Carbon Brushes
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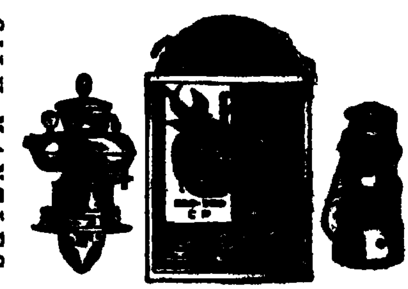
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Industry

EDITOR :

K. N. BANERJEE.

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REHABILITATION PLANS

THE most tragic of ironies of life in the afflicted State of West Bengal is that even though there is no end of planning for refugee rehabilitation on official as well as non-official levels, adequate attention has not yet been bestowed on the real task of reclaiming lakhs on lakhs of unfortunate persons uprooted from their homes for no fault of theirs. Whatever relief has been provided to them so far is temporary, efforts to help them on to their feet on a permanent basis being nil.

Perhaps, most of us are working under the delusion that the refugees will go back to their previous homes. Wise men, however, know that such prospects are unlikely to mature into a reality and so stress their absorption into the socio-economic life of their new sanctuaries.

Provided with suitable opportunities the refugees will cease to be the burden they are now on us and make valuable contributions towards developing our backward agro-industrial economy. How precisely this can be done is indicated in a recent 13-point plan formulated by a non-official body called the Bengal Rehabilitation Organization. The BRO's scheme aims at refugee rehabilitation and through it, the revitalization of the partition-shattered economy of West Bengal.

The BRO's scheme emphasises the need for reclamation of waste lands which it estimates to be no less than 2m acres in West Bengal alone. Settlement of refugees, it says, is possible on these waste lands after reclamation and this should be done on a co-operative basis with the help of modern plant and machinery. These areas can be converted into agro-industrial colonies where refugees can be put on the job of developing agriculture and a large variety of small industries.

But the scheme stands little chance of a favourable reception at the hands of the Government from whom the requisite finances should come. Besides being non-official in origin it suffers from a serious demerit, namely, that it turns on the idea that exchange of population between the two Bengals is necessary.

(Continued on page 234)

—CURRENT TOPICS

SCIENTIFIC RESEARCH

The pursuit of scientific research as an academic activity is now yielding place to research that aims at promoting India's economic development on a scientific basis. Not that India has yet achieved any success worth mentioning in the matter. But there is much that is heartening in the interest now being taken in this country in the necessity of harnessing science to the task of keying up our economic development.

Addressing the 13th. annual meeting of the Court of Indian Institute of Science in Bangalore last month, its Chairman Sir V. N. Chandravarkar stressed the need for co-ordination of research for the purpose of avoiding duplication which involves wastage of time, money and energy. It does not require more than commonsense to agree with him on this point. Sir V. N. Chandravarkar envisaged the creation of an organization for making "a common pool of the results of research in the various institutions in the country". This body, he said, would consist of scientists, engineers and industrialists and study the set-up of the existing research institutions and the industries since the development of the latter depended on scientific and technological progress.

Sir Vithal also regretted the tendency of scientific workers in this country to migrate from place to place. But the very fact that they have to do so is a glaring commentary on the opportunities and amenities usually provided to them. The tendency to migrate is due to the lack of proper encouragement and emoluments which they receive. It is a common phenomenon here that qualified men of science sometimes had to abandon science and adopt some other profession for a living. The remedy lies not in eulogising science and scientific activity as such but

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(Continued from page 333)

The officially sponsored Ayyanger Committee has put out another rehabilitation programme which has been accepted by the Government. This is an attempt to deal with the problem on an all-India basis. But the sum of Rs. 75 crores it has recommended for rehabilitation during three years is niggardly compared with the needs of the refugees. Already, the Government of India has spent Rs. 70 crores in 2 years for rehabilitation, with what result it requires no recounting. How much progress in the matter, therefore, can be made with Rs. 75 crores to be spent in 3 years ?

The Government may, of course, plead its inability to go beyond its present means and resources. And the irony of it all is that refugee rehabilitation is hardly achievable so long as the Government seeks to keep its expenditure on refugees within the limits of India's present economy. Perhaps, the way out of the difficulty lies in and through a satisfactory solution of the problem of evacuee property. Some sort of a settlement has been reached with regard to movable property, but the immovable property question up till the time of writing remains locked up in a state of stalemate.

in making arrangements for payment of proper remuneration to scientific workers for their socially valuable labour. Money for the purpose must come from both Government and the industrial magnates.

FOOD MINISTER'S OPTIMISM

Food Minister, Mr. K. M. Munshi took some pride in announcing at a Press Conference in Delhi last month that the extra production of foodgrains during the year would come up to 935,000 tons against the target of 985,000 tons. But the shortage of 50,000 tons might be lessened further when final figures for all the States would be available. He thought that the total additional production would be about 962,000 tons, that is, 98 per cent of the target.

Recent damages to crops caused by floods, heavy rain and cyclone, however, tell a different story. Take, for example, the case of West Bengal. It is officially stated that the State will experience difficult food situation for the rest of the year and perhaps the next year as well. One of the causes of this is diversion of land from paddy to jute. We wonder why that kind of thing was permitted at all. There is need for jute, we admit. But certainly food is more important. Reporting on the damage caused by recent rains, the *Statesman* says: "Another disaster had suddenly overtaken the State, namely, the cyclone, torrential rain and subsequent flood in the middle of June. It would take some time to arrive at a correct estimate of the damage done by this calamity but the preliminary reports showed that in Jalpaiguri and Cooch Behar districts considerable damage had been caused to *aus* crop and partly also to *aman* seedlings and a large number of cattle had been killed. Aman seedlings in some parts of Midnapore and Birbhum districts had also been damaged. Sand had deposited on some arable lands rendering them unfit for cultivation for some time. Some stocks of rice and paddy in these districts had been washed away."

Mr. R. K. Patil, till recently Central Food Production Commissioner and now a member of the National Planning Commission, also participated in Mr. Munshi's Press Conference. He expressed the hope that "given a good or even an average season" it might be possible to make India self-sufficient in food by the target date of March 31, 1952. His optimism is warranted by the following two facts; firstly, all States have recorded increased procurement figures this year reflecting the improvement in the total yield; secondly, the prices of foodgrains have fallen in several States. While not intending to discourage official assessment of the food situation, we feel we ought to point out that we never can be sure about the results of our efforts to grow more food so long as we do not care to emancipate cultivation from the vagaries of weather. It is no doubt heartening to note that Authority is bestowing some attention on reclaiming land, preventing soil erosion and making suitable facilities for irrigation. As disclosed by Mr. Patil, 70 per cent of the increased yield in 1949-50 has resulted from such works as land reclamation and irrigation.

FOREIGN EXCHANGE BUDGET

It is reported that the Government of India has drawn up the foreign exchange budget with a monetary ceiling ranging from Rs. 37 crores to 47 crores a month for imports during the next 6 months. It is stated that immediate relaxation of austerity with regard to imports from the dollar area is not possible. India accepted 25 p.c. cuts in her imports from the dollar

area along with other Commonwealth nations as a measure to conserve the dwindling dollar resources. Devaluation has provided a fillip to our exports both to the dollar and sterling areas. The trade balance is reported to be favourable but in the coming months India may not be able to maintain that position. Already, export of groundnut has been stopped and further, with regard to imports from the dollar preference will have to be given to capital goods and essential raw materials. This means that in respect of other articles from the dollar area import restrictions will prevail for quite some time to come.

The following details are available with regard to India's trade with the sterling area during 1949-50:—

So far as India's trade with sterling areas is concerned, informed quarters feel that it is very satisfactory. The sterling balances, which have been augmented by Rs. 2 crores during the year ending June 30, 1950, now stand at Rs. 830.12 crores. At the time of devaluation, the balances amounted to Rs. 789 crores and they improved steadily to Rs. 828.11 crores in December 1949 and they improved steadily to Rs. 858.78 crores by the end of March 1950. In April, India withdrew sterling valued at about Rs. 10 crores, in May about Rs. 17 crores and in June about Rs. 1½ crores. The overall position is that as compared to the balances amounting to Rs. 821.11 crores in July 1949, they now stand at the figure of Rs. 830.12 crores. Under the Indo-British Sterling Balance Agreement, India is entitled to withdraw £.70m a year, but she had no occasion to withdraw this year.

RATIONAL UTILIZATION OF RESOURCES

The President of the Federation of Indian Chambers of Commerce and Industries, wants the Planning Commission to formulate an integrated plan to achieve the most rational utilization of the country's resources. He has pointed out the necessity for setting up a statistical section for collection and analysis of statistical economic data. He has also asked for co-operation between the Government and businessmen "in analysing the problems before the country and in formulating a development programme that would define the most suitable methods of achiveing improvement in living standards and set up priorities to be accorded to different projects". Provided an integrated plan is thrashed out there would arise no occasion for Government incursions into the private sector and that would go a long way towards restoring confidence among private investors. It will be false economy on the part of the Government if all the present plans are abandoned on the plea that they are not based on sure and firm foundations. Integration will eliminate the risk and make for well-co-ordinated development of the country's economy in a fruitful scientific manner.

FOODGRAINS PROCUREMENT COMMITTEE'S REPORT

Controls are undoubtedly irksome, but they can hardly be withdrawn so long as there is a genuine shortage of the controlled material. Those who want an early abandonment of food control seem to have failed to profit by the lesson of the muddle created by withdrawal of control on sugar last year. On the other hand it has to be admitted that there is no point in retaining controls for their own sake nor would controls help in removing scarcity. They are at most a temporary make-shift and run on the principle that when there is shortage of a particular material, let none have the whole of it while others totally go without it. The

Foodgrains Procurement Committee recommends that at present decontrol of foodgrains is not advisable, the most urgent need for time being the establishment of a stable and reasonable price level of foodgrains by means of control. Controls by themselves, however, cannot achieve this objective unless they are supplemented by an all-out drive for increased production of foodgrains. The temporary expedient of controls is good so far as it goes, but the ultimate stress must be on increased production.

The recommendation of the Foodgrains Procurement Committee is something of a challenge to a previous food committee known as the Foodgrains Investigation Committee which had earlier suggested that "having regard to the goal of self-sufficiency in 1951, the country should be prepared from now on for the abandonment of controls and return to normalcy". But it will be risky to act upon such notions and, perhaps, baffled in its efforts the Government will only make a mess of its job by jumping from control to decontrol and back again from decontrol to control.

The Foodgrains Procurement Committee asks the Government to honour their rationing commitments and increase them if necessary. But that would require procurement of adequate quantities of grains from peasants who are often found to be reluctant to sell their produce to the Government as they think it is more profitable to sell to black marketeers who offer better prices. The Government can hardly afford to compete with them by offering higher prices to peasants, as that would run counter to the Government's aim to curb inflation. The Rao Committee (the Foodgrains Procurement Committee), therefore, recommends a uniform system of procurement which gives the monopoly of purchase of grains to the Government at the first point of marketing. This monopoly procurement, says the Committee, is the minimum uniform system to be adopted throughout the country. This means that all transaction in grain outside the individual village will be through the Government or agents controlled by it, at prices determined by the Government. This system rules out free markets and free market prices, or in other words, the grip of controls will be tightened further if the Rao Committee's recommendation is implemented. But there ought to be no resentment at measures called for in the interest of general welfare of the people.

The Rao Committee stresses the need for efficient and effective administration of controls for which it says the appointment of good service officers to the supervisory posts is necessary. But what about the men who occupy lower ranks in the official hierarchy? Should there be no check-up of their activities?

It is silly to speculate on feeble foundations and the Rao Committee rightly discourages loose talks about decontrol as well as naive optimism with but little material reason to warrant it. For efficient food administration, the Committee recommends a firm announcement of policy both at the Centre and in the States, preferably at the highest Government level, so as to set at rest the speculation on the subject of food policy. It suggests that the portfolios of Food Controls and Grow More Food should be in the hands of the same Minister in each State. "Food is and will be of outstanding importance during the next few years, and should be controlled by a Minister of capacity and influence in each State", adds the Committee in its report.

INDIA'S FOREST RESOURCES

Forests are recognized as the best of soil and water holders. India has decided to spend huge sums on river control and valley development, but these projects can hardly yield the expected result unless efforts are made to conserve and develop our forests which, recent reports indicate, are being laid waste at a tremendous rate. In view of this it is welcome news that the Government has constituted a Central Board of Forestry for securing co-operation in forestry matters and for maintaining adequate standards in forestry education. In the wet season forests help maintain subsoil reservoirs and in the dry season water stored in the soil dribbles out in springs and streams. Forests do not produce rainfall but they dispose of it better than land with forests.

A Central Board of Forestry, such as has been recently established, has a number of important functions to perform. These include securing co-operation between the States in such matters as soil conservation and flood control measures, development of industries, standardisation of timbers, evolution of forest management and legislation for control of private forests, regulation of river valleys, and the preservation of tree growth in headwaters. Plantation of trees undertaken with great gusto in the different States under official auspices and at the instance of the Food Minister, Mr. K. M. Munshi should not be regarded as an aesthetic occupation. It is a very mundane affair the value of which should be estimated in terms of its material utility.

The functions of the Central Board of Forestry will be: (1) Co-ordination and integration of the forest policies of the different States; (2) adoption of measures for soil and forest conservation; (3) promotion of legislation for the management of private forests; (4) regulation of forests in inter-state river valleys; (5) maintenance of adequate standards for training officers; (6) co-ordination of forest research; etc.

—Micanite & Its Industrial Utilisation

MICANITE or build up mica is a significant development of far reaching economic importance in the utilisation of mica splittings. The most usual method of building mica products is the hand method in which the splittings are individually placed in position. This process is laborious, but, where reliable operations are available, it probably results in the best product being obtained. In making mica plates thin pieces and irregular films are split to about 0.005 inch in thickness and are then placed on a steam table and painted over with a preparation of shellac. Other layers are added and painted, until a plate is formed of the desired thickness, usually from 1/10 inch to ¼ inch. This plate is then submitted to hydraulic pressure varying from 100 to 200 tons. The press plates are heated by steam, to keep the mica plate warm throughout the operation. After being dry-baked in an oven or kiln, the plate is run through sand paper rolls or millers. These rolls are adjustable, and grind the plates to a uniform thickness. The size of the mica plates ranges from 36 inches square downwards. These large surfaces are then cut up into pieces of the desired dimensions by means of hand-saws, or if small, by dies or punching presses.

Machine methods of building are, however, used in many factories in recent years. The most favoured machine method is the so-called mica tower, in which the splittings are "scurried" down a tower in blasts interspaced with a "peppering" of powdered bond. It may be pointed out that the arrangement at the head of the tower needs a very careful arrangement of baffles and air jets to obtain uniform results. The stacks of splitting and bond are very carefully removed from the base of the tower to ovens, where the bond is melted before it becomes dislodged, and the sheet is subsequently hot pressed.

Amongst other methods of mechanically building micanite one more or less successfully employed has been to deposit each layer of splittings by letting them drop an inch or more from the wire mesh bottom of a suction box against which they are drawn in from special splitting bins and retained so long as the partial vacuum is maintained. As soon as the vacuum is broken the splittings fall. They form a uniform surface, since they are uniformly distributed on the suction box by the vacuums.

Mica splittings are thus used to build up mica plates principally in three finished forms, namely, (1) sheet micanite, (2) hot-moulding micanite and (3) cold-moulding micanite. Sheet micanite is generally used for flat insulation work, such as insulating segments in commutators and heating apparatus, etc. Hot-moulding sheets are used for moulding, brushings, washers, commutator V-rings, channels and corner cells, etc. Cold moulding sheets are used, without being treated for binding around sharp corners as are encountered in forming slot insulation coil wrappers, coil sheaths, etc.

COMMUTATOR SEGMENT INSULATION

This kind of insulation is applied particularly in such flat insulation work which is not ordinarily subjected to high temperatures, but it must not contain foreign matter.

In building up the segments of commutator the component layers of mica splittings, attention should be directed to make the resultant plate very hard,

uniform in thickness and heat resisting with minimum of binding agent in it. The manufacture of this class of compressed micanite is carried out in the following manner: The finely split mica scales are laid out over a large table in such a manner that they just overlap, having no spaces between. When such a layer is completed a strongly insulating binding material is spread over it, and then a second layer is laid out in such a manner that the joints in the lower layer are covered by whole pieces. Several layers are made up in this way until a plate of the required thickness is produced. The plate is then put into a large steam-heated hydraulic press, and subjected to a very great pressure. This stage of the manufacture is particularly important, as the quality of the micanite depends to a very large degree upon the temperature and pressure employed. The varnish or binding material is almost entirely pressed out of the micanite during this operation, so that the finished plates contain not more than 1 per cent or 2 per cent of binding material. After cooling, the plates are planed smooth and to an equal thickness. The variation from the required thickness must not be more than 0.025 of a millimetre, and the accuracy of this measurement is controlled by specially constructed instrument.

The ingredients of the binder must not prove corrosive on copper or become conducive nor should it display a detrimental effect when lead is soldered to the commutator bars at high temperatures.

According to Prof. H. Schering the sheets of mica splittings built up with suitable binders are hard enough to give a clear sound on being struck.

MOULDING INSULATION

It has already been stated that moulding micanite is extensively used for moulding cones, brushings, V-rings, spools, armature slots, troughs, commutators, etc. as also to wrap transformer partitions, field coils, tubings, and cones.

This type of micanite should be sufficiently softened at 100°C so as to be readily moulded into any desired shape without the risk of flaking, cracking or breaking. Moulding micanite contains a greater proportion of the binder components than that of the commutator plates which is usually about 10 to 12 per cent and it is not required generally to resist very high temperatures. On cooling, the sheet regains rigidly, uniform pliability being an essential property of this class of micanites.

The manufacture of this type of moulded plate is easier than that of the commutator plates, owing to its being allowed to retain a greater percentage of shellac or binding component, but it is for this reason difficult to ensure accurate measurements, certain variation being inevitable. This form of micanite is supplied in sheets which when cold are hard and inflexible. The material may, however, be rendered perfectly flexible by heating on a hot plate to a temperature of 105°C to 115°C when it may be moulded into any desired form. The milling of the moulding micanite somewhat damages the structure and lowers the puncture resistance of the plates. The moulding plate is cut to the required shapes and sizes by means of stamping machines, hand-cutters or strong scissors instead of saws. The smaller the radius of the size to be punched the greater is the chance of such fraying out of the laminations even in cutting by hand-cutters or scissors.

COLD MOULDING OR FLEXIBLE MICANITE INSULATION

This type of micanite is used in insulating armature, slots, transformers,

coils as well as for forming channels and rings.

When used in transformers, it should not be affected by swelling at 150°F to 250°F. It is applied without heating for binding around sharp corners as are encountered in forming slot insulation, coil wrappers and coil sheaths.

It is made with non-drying varnish and can be formed or bent into any desired shapes without applying heat, the sheets being sufficiently flexible in the cold state. Flexible micanite therefore should not be heated like the moulding plate while lining the curved surfaces. It should, however, have a good-electric strength and stand a high puncture resistance test.

MICAFOLIUM

The term "Micafolium" is generally used to define a special product consisting of mica splittings built on a continuous length of strong kraft paper utilising special binder. In its manufacture, only best quality flexible Grade 5 Muscovite mica splittings are used, and they are built up on the Kraft paper backing, using a special bonding varnish containing a large percentage of shellac. One, two, and sometimes three layers of splittings are employed, although with three layers difficulties are sometimes experienced in utilising the material in the wrapping machine.

Micafolium is used extensively for large electrical machines and affords an extremely convenient method of insulation, where percentage of mica in the final wraps is not required to be more than 30 per cent by volume.

HEAT-RESISTING MICANITE

The development of heat-resisting micanite has progressed rapidly with the extended use of electricity for domestic purposes. Heat resisting micanites are made from Muscovite mica and phlogopite mica splittings. Generally speaking, the selected Muscovite mica splittings are used for low temperature work upto 450° to 500°C but when this temperature is exceeded phlogopite mica splittings are to be recommended, since this class of mica is capable of withstanding a working temperature of 850° to 900°C without deterioration. The bonds used for the manufacture of heat-resisting micanite vary considerably, but, amongst others that have been successfully tried, silicate of soda, kaolin, and bentonite may be mentioned.

MICANITE PAPER

Flexible micanite is sometimes coated with thin tissue paper on both sides, Thus coated it is styled as micanite paper. Such paper backing prevents exfoliation and insures compactness against easy integration. Mica paper is preferred to use in armature slots, commutator cores, magnets etc.

MICA CLOTH

Similar to micanite paper, one two or several layers of carefully selected mica splittings are bound between a fine quality of linen, cloth, silk, muslin or sometimes paper is used on one side with linen, silk or cloth on the other.

Mica cloth is used in the insulation of commutator cores, transformers, field coils, armature slots, commutator cores and field magnet.

MICA ASBESTOS

This is generally made of a layer of mica splittings of 0.2 m.m. on one side and a layer of asbestos of at least 0.5 m.m. thick on the other. It is used in the mounting of electrical heating apparatus and the insulation of windings of flat copper hole pieces for motors and alternators of high power and temperatures.

MICA TAPES

This class of material is built of a layer of thin carefully selected mica splittings overlapped and bound between two layers of thin strong insulating paper on both sides.

Tape is used where sheet material cannot be conveniently applied such as for wrapping and winding coil, sharp bends, closed coils, armature as also strap and bar-wound armatures, etc. where they are subjected to higher temperatures, which the ordinary insulated fabric and cotton cannot stand.

—SPRAY DRYING

By Sri K. MANIVANNAN.

DRYING commonly refers to the removal of water when the water is present in relatively small amounts, at a temperature far below its boiling point; and this may be accomplished by various means such as pressing, centrifuging, absorption and vaporization of the water content. The last one is the most expensive way of drying; so usually this is employed only for removal of the last traces of water which cannot be removed by other processes. But in 'Spray Drying'— as the name indicates, drying the liquid by spraying in presence of a hot medium —the last method is employed in view of the peculiar type of product we get here.

A common important feature of spray drying is the direct conversion of spray liquor to granular product suitable for packaging without grinding or other intermediate handling, the individual particles are rounded in shape and hollow to a degree which is controllable over a rather wide range in operation of the process. This form has important advantages like rapid solubility, lesser hygroscopicity, unusual mobility in handling. The other important advantage is the rate at which drying is accomplished, drying being done at the wet bulb temperature of the solution, which is far below the boiling point of the solution. This makes the process particularly suitable for drying heat-sensitive materials, some of its important applications being the drying of milk, egg, blood etc.

Spray drying consists primarily in fine atomization of the liquid or slurry containing solids in the presence of a desiccating medium, so as to evaporate the liquid phase and leave the solids in free suspension in the gaseous phase consisting of the desiccating medium and the evaporated liquid. Secondarily it consists of the removal of the solid particles in powdered form from the gaseous and vapour phase.

The process consists of producing the desiccating medium, atomizing the liquid containing solids, bringing the two into contact in such a manner as to remove all the moisture while all individual particles are in free suspension and removing the dry particles from the system. Each and every operation of the process is described in detail in the following paragraphs.

Usually air is used as the desiccating medium which is heated by steam-coils equipped with controlled valves; exhaust steam is used in the first coil section and high pressure steam in the subsequent section. In Europe, hot oils and several other heat transfer fluids have been substituted for steam; in America, 'Dowtherm'—a mixture of 26.5% di-phenyl and 73.5% di-phenyl oxide has replaced steam. Or the air may be conducted through flues installed in a furnace. Heating by flue gas is economical provided there is plentiful supply of the gas at the high temperatures. The chief dis-advantage here is the rapid deterioration of heating tubes. Direct method of heating may also be employed. Some suitable oils are burnt in oil furnaces lined with Carbofrax which give quite a clean airflue gas mixture which may be used as the heating medium; here by means of dampers it is possible to control the condition of the desiccating medium.

Air, to be heated, should be drawn through a filter located at the intake of heating inlet. This filtering may be water-spray or wiremesh gauzes over which

water is trickling. The blower is installed either at the intake of the cold air of the heating unit or at the exit of the drying chamber. The latter location has the advantage of creating a slight vacuum in the drying chamber which avoids the product being blown out when inspection ports are opened and which should also theoretically increase the rate of evaporation. The air-velocity should be optimum, that is, it should not exceed 600 linear feet per minute in the intake and exhaust ducts; if it is too great, entrainment losses will be greater; and friction in the ducts will be increased which will result in higher power consumption. The temperature to which air is heated depends on the highest temperature the product will stand without injury; and on the degree of turbulence of mixing of this air and particles of liquid to be dried. (Higher the turbulence, higher can be the temperature of air used). And it also depends on the comparative cost of high and low temperature sources of heat.

Performance of any spray drying system, both in thermal efficiency and continuity of operation, depends on the proper design of the spray liquor system. So the various types of atomizers that are employed and also the characteristics of particle formation in each of these are described.

Pressure nozzle used here is usually tangential entry, spin-chamber type. The character of the spray depends on the relative velocity created in the spin-chamber immediately behind the nozzle orifice, by the pressure in the spray liquor line. This pressure depends on viscosity of the liquid and particle size wanted.

In two-fluid type, steam or air is used at pressure which furnishes the energy for atomization, pressure depending on nature of raw material to be dried, and the type of product wanted. Here [illegible] can be done either internally or externally.

Different types of centrifugal atomizers are used, the simplest being disc atomizer, in which the disc rotates at a high speed and the liquid is supplied at low pressure. The slip is great and results in the formation of particles of irregular size. Discs with angular projections are used, which are particularly suitable for slurries containing particles of irregular size. Discs hollowed towards the centre, and raised at the periphery are also employed; there will be greater adhesion between the liquid and the disc and the slip is reduced thereby. Another improved type consists of a central ring with a number of openings in the outer periphery; a cup is formed between the central ring and the disc wherein the liquid is fed. The holes are big enough so that there is no clogging and hence easy cleaning. This gives a narrower range of particles than any of the above types.

The speed of the centrifugal atomizers will be 5000 to 24000 r.p.m. that is the relative speed will be about 6 miles per minute. Under these conditions the air surrounding it becomes dense wall of great relative inertia that materially assists in pulverizing the fluid. These are driven by electric motors or steam turbines. Frequency variation was used for speed change. But gear drives are used nowadays. Most designers have tended towards heavy construction for the mounting of spray wheel, disc etc., while Bowen believes in lightness as a means of overcoming bearing troubles at high speed.

From design and operating point of view, the pressure nozzle has relatively a lower capacity per nozzle in general than the other two; when used in large chambers, it is usual to find several nozzles

arranged symmetrically to cover the cross-section of the chamber. The other two can be designed to handle large throughput, so that only a single spraying station is needed for even a relatively large chamber. These two are less susceptible to clogging and better adapted to handling either heavy or viscous solutions. These two can be designed to dispose of any material that can be pumped to it. In uniformity of particle formation the pressure nozzle and the centrifugal will give a narrower range of particle sizes from a given spray liquor than two-fluid nozzle.

The important characteristic of spray drying includes size, uniformity of size. shape, density and structure which are affected by nature of material to be dried and the manner of spraying. As far as particle form is concerned, most important characteristic is fluidity; another important factor, less obvious in its action is surface tension. The formation of smaller particles involves the production of large area of surface. The energy of the surface, that is, the product of area and surface tension must be supplied by spray mechanism. Surface tension has also a marked effect on formation of particle. High fluidity and high surface tension tend to produce spherical particles and to permit easy control of particle size.

Three distinct operations of the spray nozzles are:—(i) breaking up the fluid into particles of proper size; (ii) forming these particles into suitable external shape and internal structure; (iii) distributing the particles in desiccating medium.

In the spray nozzles, first fluid is dragged out into thin flat sheets or filaments, both of which are unstable and hence break up into particles under the combined action of surfaces tension, internal viscous forces and turbulence in the surrounding medium. The characteristics of particles formed from filaments and sheets are essentially different.

Pressure atomizer and the centrifugal atomizer are film forming type. Energy for breaking up of the fluid is supplied directly to the fluid in the form of pressure in the former type and in the form of velocity in the latter type. Pressure nozzle gives widening conical film of spray or flat fan-shaped spray while centrifugal atomizer gives a sheet of fluid. The motion of air past the surface of the film of liquid, shot at a high velocity, gives rise to 'turbulence' which causes the liquid film to curl up on the free edge, until it may actually join in a hollow tube; such a tube being statically unstable, necks down in places and breaks into a series of hollow spheres, the formation of which has been photographed by Edgerton and Germaushausen. And this transition from the film at the nozzle to the round particles is complete within a few inches of nozzle. In order to get satisfactory atomization in the case of viscous liquids, high pressure and high velocity (i.e. high r.p.m.) is employed in the respective types.

In the two fluid type, fluid delivered at a low pressure is torn into threads or filaments by a high velocity of compressed air or steam. The energy which can be imparted to a pound of liquid in the form of pressure is very small in comparison with energy available in one pound of air or steam (shown in the table) :—

AIR				STEAM			WATER
Pressure on nozzle, psi guage	Initial Temp. Deg. F.	Expansion Deg. F.	Energy Ft. lb. per lb.	Initial Temp. Deg. F.	Expansion Deg. F.	Energy Ft. lb. per lb.	Energy Ft. lb. per lb.
15	80	—17	7200	250	150	3900	35
30	80	—65	10800	275	113	6300	69
60	80	—119	14800	308	74	9800	138

	AIR			STEAM			WATER
Pressure on nozzle, psi guage	Initial Temp. Deg. F.	Expansion Deg. F.	Energy Ft. lb. per lb.	Initial Temp. Deg. F.	Expansion Deg. F.	Energy Ft. lb. per lb.	Energy Ft. lb. per lb.
90	80	—150	17100	331	87	11500	207
135	80	—180	19400	358	14	13400	312
210	80	—210	21600	392	— 8	15600	485
285	80	—230	23100	417	—14	16800	658
2000	80	..	..	..	...	....	4600

Therefore the pressure of filming type nozzle is limited in its action to relatively fluid materials that are easily broken up. On the other hand in the two fluid type the amount of energy available which can be varied by changing the ratio of atomizing air or steam permits atomization of any material that can be fed to the nozzle; and it is possible to obtain extremely fine atomization, and also perfect distribution of energy resulting in uniform spraying action. The atomizing action, here again, is due to the same turbulence. When there is pulsation in the stream of gases, which is determined by the relative sizes of the passages in the nozzle, uniform spraying action is not to be expected.

Temperature effects due to the expansion of steam or air in the atomizing nozzle are considerable; the table indicates temperature drop due to expansion to atmospheric pressure. Owing to the relative velocity and intimacy of contact there will be enormous rates of heat transfer and hence even when the materials are supplied hot they will be chilled by many degrees at the actual point of particle formation. This prevents surface tension from acting to round the particles and hence irregular shaped particles result; and this also prevents the rapid drying action that would otherwise be expected at the nozzle. And finally the particles are cooled on entering the spray chamber and will tend to remain so during the drying process.

In drying, i.e., in removing water from the particle suspended in hot air, a definite amount of heat is required to evaporate water from the particle suspended in hot air. There are three possible sources of heat:—(i) Internal heat of the material itself which is necessarily limited in its capacity. However the ready availability of the heat will be immediately effective. The utilisation of this internal heat will be accompanied by marked fall in the temperature of the material to be dried. (ii) Radiation from hot surfaces since it permits instantaneous heat transfer from a considerable distance. (iii) Heat transferred by conduction and convection from the surrounding medium which is of major importance in spray drying.

When a body having a moist surface is exposed to air, an equilibrium is set up, in which the surrounding air is cooled by evaporation until the air is saturated at the wet bulb temperature. As drying proceeds, the particles, if suspended in still air, becomes surrounded by thicker and thicker layer of cooler air. So vigorous motion of the particles through the drying gas is important. As the particles are very small, some form of centrifugal action such as turbulence is necessary to produce the relative motion.

The path of drying gases is the greatest point of variation. Vertical upflow countercurrent equipment is being used for drying of soaps and detergents and its classifying ability is useful for this application. The general trend is the downward and concurrent flow. The entering gas stream is frequently split; one portion top centre of the cylindrical chamber through an open-

ing surrounding the spray machine and above the sheet of the atomized spray. This flows at a sufficiently high velocity to form in effect a dynamic cap over the top of the spray, which the spray cannot penetrate. The other portion is admitted simultaneously through a manifold to vertical slots forming a band of nozzles opposite and below the level of the spray, the axis of which is set 15 Deg. to the radius so as to produce a violent vortex with dynamically rigid walls. The atomization takes place within the true dynamic cylinder, closed at the top with a dynamic cap; so the particles from the atomizer will not strike against the sides of the drying chamber. This vortex is also under considerable draft as the velocities are high and this also aids evaporation by increasing the potential difference between the liquid and the vapour phase. This mechanism makes possible almost instantaneous evaporation and consequently reduces the size of the drying chamber. A cooling band, similar to hot one is provided to cool the dried particles, which are in suspension in the central vortex, which have low melting points.

The size of the spray drier (i.e. diameter) lies between a minimum below which particles from the atomizing device hit the wall before they are dry and a maximum beyond which atomization and the flow of drying gas cannot be so controlled as to give a fairly uniform reaction between the spray and the drying media. The minimum diameter will depend upon the uniformity of performance of atomizing device and the average size of the particles. With fine products 150 to 300 mesh drying chambers of 5 ft. in diameter may be operated successfully with atomizers having uniform performance. Chambers of diameter 10 to 20 ft. are more common and generally preferred as these large chambers with greater production little more operating attention than a smaller one. The height of the tower is determined by the trajectory of the atomizing device, the path of stream, and the drying characteristic of products handled. In general spray chambers need not be as high in systems using centrifugal atomizers as in those using spray nozzles, pointing downward. Additional height is required if the diameter is to be used advantageously in handling products which requires admission of cooling air below the drying zone in order to prevent them sticking together.

It is necessary to remove the dried products as quickly as possible from the drying chamber as prolonged exposure of product to heat is deleterious. The portion of the product that settles at the bottom of the cone of the drier is continuously removed by a system of brushes and screw conveyer or a suction fan installed at the bottom of the drier in case of fine particles; the other portion, which is a good percentage, carried away by the exhaust air is trapped by using cyclone or a number of cloth bags or both the former followed by the latter. In some cases, the exhaust air is scrubbed by the liquid to be dried thereby increasing the thermal efficiency, improving the quality of product and reducing the entrainment losses (for e.g. Spray Drying of milk).

The efficiency of spray drying and the factors controlling the same are described in the following paragraphs. The usual work done in the drying zone is proportional to (100-R%) of $(T_1\text{-}T_2)$ or thermal efficiency of the spray chamber operation may be stated as $(1\text{-}R/100)(T_1\text{-}T_2)/(T_1\text{-}T_0)$ where T_0-temperature of atmosphere

T_1-temperature of inlet gas (to drying zone)

T_2-temperature of exhaust gas (from drying zone)

R - percentage of radiation loss.

From the above equation, it is obvious that the following factors make for and control the efficiency of the spray drying operation:—(i) high inlet temperature; (ii) low exhaust temperature; (iii) recovery of heat from exhaust gases beyond drying zone; (iv) reduced radiation losses.

Inlet temperature is determined by three factors:— (i) Temperature which can be safely used without damaging the products; (ii) The comparative cost of high and low temperature sources of heat; (iii) Bulk density (Higher the inlet temperature, less is the bulk density.)

Exhaust temperature presents the point at which the useful work of the drying medium stops. If inlet temperature, volume of gas, the capacity of the drier, rate of feed, concentration of spray liquor are constant then exhaust temperature is the control index of the drier; or by adjusting the rate of feed the exhaust temperature may be held constant.

There are three approaches for recovering heat from exhaust gases. (i) Recirculating exhaust gas through the drying chamber. This cannot be done in the case of temperature sensitive materials, as the product will be damaged. Complete removal of particles from exhaust air involves enormous expense and further in so doing the temperature of the exhaust air falls off. There will be fire hazard and explosion in the case of organic materials. (ii) Preheating fresh dry air. (iii) 1. Preheating is done to lower the viscosity (for e.g. soap solution). 2. Preconcentration is done in the case of solutions of high water content such as milk, blood, etc., (the last two operations affect the bulk density; higher the feed concentration and feed temperature less is the bulk density).

In order to reduce radiation losses, the drying chamber and the ducts leading to, and from the chamber should be insulated. The usual economic balance must be considered between the cost of insulation and the value of heat saved.

Overall efficiency of a spray drier depends on the nature of the material treated, extent to which actual thermal efficiency approaches the theoretical efficiency and uniform operation of the atomizer.

It is particularly difficult to draw any general conclusion as to economy of the spray drying because of the extreme variation in the thermal efficiency of drying operation, over the range of materials that may technically be handled by the process. The direct economy of the drying operation is seldom the determining factor. Important considerations are the form of product not duplicated by the other types of drying and physical properties in keeping quality and use; its ability to control the bulk density, as defined by the weight per unit volume of product, one of the most important product characteristic; and ability of the process to handle heat sensitive materials, which is paralalled only by vaccum drying; and to handle sticky amorphous substances which presents great operating problems in the other types of drying; and the product we get here is ready for packaging grinding or any intermediate handling.

The following are made on a commercial basis by spray drying.

1. Milk products.
2. Soluble coffee.
3. Soluble tea.
4. Pectin.
5. Eggs.
6. Potatoes.
7. Yeast.
8. Prepared cocoa.
9. Lemon juice.
10. Pratially hydrolized starch products.

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—Masking the Odour of Cosmetic Ingredients.

APART from the necessity of masking the odour of some household and technical preparations such as insecticides, polishes, cleaning compositions, plastics, rubber, paints, inks, etc., the odour of some of the constituents of certain cosmetics (e.g. fats, oils, waxes, solvents, earthy pigments, active chemical compounds, etc.) which are used in their manufacture, have to be treated in a similar manner.

In this problem the perfumer is obviously expected to present a perfume combination of a fragrantly fashionable odour, in order to eventually cover or dispose of a potent, unpleasant basic smell in an ingredient, and yet be olfactorily in keeping with the character of the finished product. Frequently a perfume blend, which might presumably otherwise be satisfactory, can only be used in these instances if appropriate and careful adjustments are made to the final formula.

Among cosmetics there are several types which call for special attention when perfumed, such as medicated preparations (soaps and creams), hair cosmetics (tonics, shampoos, brilliantines, wave-set preparations), manicure preparations (lacquers, bleaches, cuticle removers), beauty products (lipsticks lotions, creams), etc.

In these preparations the necessity for masking arises owing to the presence of certain important compounds bearing an objectionable odour, or when unsatisfactorily purified materials are considered necessary, or when the introduction of substitutes has to be made owing to price of shortage of primary materials.

The following notes by Dr. *T. Ruemele* in PERFUMERY AND ESSENTIAL OIL RECORD will provide illustrations in dealing with the main theme of this article.

Lanolin—An excellent and efficacious emollient, possessing factors of physiological importance and representing a valuable constituent of lipsticks and beauty preparations (lotions, creams), yet bearing a very distinctive and not too pleasant fatty odour. This defect tends to limit its value, and impairs the quality of the final product if masking of the odour is not effectively carried out. Generally, floral bouquets (e.g. roses), with a modern finish as a result of incorporating a fruity note (e.g. poseudoaldehydes), provide an excellent example with which to solve this problem satisfactorily both in regard to the fragrance and the flavour of lipsticks. Flower and balsam perfumes used in conjunction with lily bases (terpineol, hydroxycitronella) and benzyl acetate, etc., a substance suggestive of jasmine flowers, would give similarly good results in beauty lotions and creams.

Safrole, chemically the methylene ether of allyl pyrocatechol, serves to cover the unpleasant smell of ingredients which are chiefly used in soaps, and the masking power of the safrole is notably increased when combined with rosemary oil and spike oil.

COLOGNES, HAIR & NAIL PREPARATIONS

Isopropyl alcohol is used in eau de Cologne formulae, hair tonics, wave-set lotions, manicure preparations, etc. This solvent has an acetone-like odour which becomes enhanced when water is present. But it should be pointed out that isopropyl alcohol alters the fragrance of the perfumes; thus, orange and bloomy scents become disagreeably sweet, and

floral and light perfumes lose their odour almost completely. Spicy and rather harsh scents, on the other hand, appear not to be affected, and tolerate the presence of isopropyl alcohol very well. In order to mask the odour of isopropyl alcohol much more of the perfume base must be employed, although some saving might be effected when masking is effected by synthetics such as terpineol (lilac odour), ionones (violet odour), amyl acetate (banana or pear drop odour), ethyl butyrate (pineaple odour) benzaldehyde (almond odour), etc.

Incidentally, the smell of acetone and amyl acetate (nail lacquers) can be covered with lavender oil, sandalwood oil, bergamot oil or rose oil (individually or in combination). The ingredients of nail bleaches are preferably perfumed with phenylacetic acid, which has a honey odour. Cuticle removers need terpineol or terpeneless bergamot oil.

Active chemical compound, which might often be incorporated in cosmetics include, for instance, chlorine, e.g. chlorthymol, chloramine (deodorahts), terpene phenols, e.g. thymol (p-cymene), aromatic hydroxyketones, e.g. benzoin, witch-hazel (creams), disinfectants, e.g chlor xylenol (medicated preparations), etc. All these materials need masking, of course, in order that the finished products become agreeable to their users.

Disinfectant agents can be masked by the aromatic scent of eucalyptus oil or cineol (medicated soaps). Actually, eucalyptus oil itself acts as a disinfectant when combined with soap emulsions. The Chemical Trade Journal, 1932, 34, published the following formula: Eucalyptus oil (phellendra or olives) 25.0, olefine 10.5, 25 per cent. caustic soda solution 6.0, water 30.0 and methylated spirit 6.0. The odour is improved by the addition of 2 parts of eucalyptus oil citriodora to the diluted emulsion.

The blending of both a lilac and woody odour (e.g. terpineol and pine oil) or that of a floral bouquet (jasmin and geranium) with a fruity note (orange) viz. benzyl acetate, diphenyl ether and diphenyl methane, are useful compounds for the covering of disinfectant agents.

Nerolin and artificial musk (trinitrometa tertiary butyl toluene) are particularly effective as masking agents for chlorthymol or chloramine, frequently present in deodorants.

Thymol, benzoin, witch-hazel, when employed in creams for specific purposes, would undoubtedly need the lilac or lily perfume type of masking ingredient.

Detergents, as used, for instance, in liquid shampoos, might conveniently be covered with a lily base (e.g. hydroxycitronellal) preferably, but not necessarily, backed by a flowery balsamic scent (e.g., ester of amino-benzoic acid, terpineol, etc.)

The rose type odour is suitable where alkaline sulphides (depilatories) are concerned, but, as a matter of fact, there is no objection in using violet scents (ionones) or another flowery note (e.g. methyl tolyl ketone). Similarly, the fresh hay or woodruff smell of coumarin or even a fruity effect (e.g. beta napthol ethyl ether) might be well worth consideration.

Astringents could be masked with tri-tree oil. Sometimes pronounced floral scents coupled with a fruity note (e.g. esters of carboxylic acids) result in most striking effects, an action resembling that in the masking of disinfectants. But this is not surprising, of course, as astringents are more or less disinfectant agents.

Covering power and persistence of the fragrance in face powders in which

earthy pigments are used, are given by sandalwood, pachouli, vetivert, bois de rose, artificial musk, benzoin, styrax, etc.

Finally, it should be pointed out that fougere scents are very useful for masking purposes, and particularly rather pungent odours can be both neutralised and olfactorily improved as a result of the really skilful of a woody and a floral fragrance appreciably deepened by the inference of a fruity note. I would also mention the opportunity that methyl monylacetic aldehyde gives us for enhancing floral shading and for introducing an atmosphere of freshness (acetic aldehyde) in order to create a specific fragrance which would serve to settle many masking problems satisfactorily.

—EMULSION PAINTS

EMULSION paints are now generally recognized as *highly satisfactory* decorative finishes for interior wall work. The so-called resin emulsion are far superior to their predecessors, casein emulsion paints. To-day, a well-formulated emulsion paints has practically all of the desirable properties of the best oleoresinous or oil-type interior finishes. It is possible to make emulsion paints in flat, semi-gloss, or gloss finish.

Emulsion paints differ from the con- *ventional oil or oleoresinous finishes in* that the emulsion paints can be thinned with water for application, whereas the conventional type paints must be reduced with volatile solvents. This is accomplished by the addition of an emulsifying agent which makes the noncompatible water and oil mixture into a two-phase dispersion. Any desired vehicle with emulsifying material, water and the proper stabilizing material can be pigmented in the conventional manner to form water-reducible emulsion paints.

Water may be either on the outside of the inside phase of the dispersion. The type using water as the exterior phase is the emulsion commonly used. Further reduction with water will reduce the consistency of this type of emulsion.

Careful selection of pigments, binder emulsifying material and stabilizing material must be made to insure :—

1. A stable emulsion paint with satisfactory package stability.

2. An emulsion paint with satisfactory application properties, good hiding and good film properties.

A wide variety of vehicles can be used as binders in resin emulsion paints. It is only necessary to select pigments which are non-reactive with the vehicle selected and also to select the proper emulsifying material to produce a perfect emulsion with the vehicle selected.

The following is a list of vehicles which have been successfully used:—

Linseed oil, Dehydrated castor oil, Ester gum linseed oil varnish, Ester gum dehydrated castor oil varnish, Maleic resin linseed oil varnish, Maleic resin dehydrated castor oil varnish, Modified phenolic resin linseed oil varnish, Modi- *fied phenolic resin dehydrated castor oil* varnish, Akyd resin, Acrylic resin, Vinyl resin, Chlorinated rubber.

It is advisable to eliminate the use of volatile solvents, as these materials introduce objectionable odours and also have an adverse effect upon emulsion stability. Where sodium hydroxide or ammonium hydroxide is added directly to the vehicle to form a soap for emusifying, it is necessary to have a vehicle with an acid number of approximately 12. Free fatty acid can be added to a more neutral vehicle to increase the acid number. Other emulsifying and wetting agents can be added to give more complete dispersion of the water and oil phases. Some of the materials commonly used for this purpose are:—

Soaps, such as sodium linoleate or ammonium linoleate, sulphonated vegetable oils. Sulphonated fats, Sulphonated fatty acid esters. Mineral oil sulphonates. Higher sulphonated alcohol derivatives, Triethanolamine, Morpholine, Glyceryl or glycol monoesters, e.g., glyceryl monooleate, and many proprietary products.

It is necessary to keep in mind that in order to have good washability characteristics, the emulsifying material used must

either leave the film or change to a water-insoluble condition in the dry film.

It is usually necessary to use a stabilizing material or protective colloid to keep the oil and water phases dispersed to insure stable emulsion paints with good package stability. The following stabilizing materials are among those commonly used:—

Albumen, Alginates, Casein, Dextrins, Gelatin, Lecithin, Methyl cellulose, Carboxy methyl cellulose, Soya protein, Starches, Many water-soluble gums.

Preservatives must be used where casein or other protective colloids subject to putrefaction are incorporated in the emulsion paint. The chlorinated phenol types available under a variety of trade names, e.g., Moldex, are most commonly used.

The following is a typical emulsion vehicle and its method of manufacture:—

OIL PHASE

Ester gum	27.20	lbs.
Alkali-refined linseed oil	50.90	,,
Z-3 heat-bodied Linseed oil	55.50	,,
Linseed fatty acids	2.78	,,
Duponol ME dry	0.56	,,
Cobalt linoleate	0.74	,,
Lead linoleate	6.10	,,
Ammonium hydroxide (28%)	1.17	,,

Dissolve the ester gum and about one-half of alkali-refined linseed oil at a temperature of about 375°F. Then add balance of alkali-refined linseed oil, bodied linseed oil, linseed fatty acids, Duponol, cobalt linoleate, lead linoleate and ammonium hydroxide, with constant stirring.

WATER PHASE

Alginate (sodium or ammonium)	1.33	lbs.
Hot water (150°F)	296.00	,,
Dowicide A	5.93	lbs.
Dowicide G	4.90	,,
Pine oil	4.90	,,
Diglycol laurate	4.90	,,
Muriatic casein	47.40	,,

Add alginate to about 90 lbs. of the hot water and allow to stand and swell.

Put the balance of hot water in a tank with good agitation, add the casein slowly. Then add the fungicides, pine oil and antifoam. Finally add the alginate mixture and continue agitation until all casein is in solution.

EMULSION VEHICLE PREPARATION

Add the oil phase gradually to the water phase with constant agitation until the emulsion is uniform. Then add 330 lbs. of water and continue stirring until the emulsion is uniform.

The properly prepared emulsion vehicle can be pigmented in the same manner as conventional coatings by mixing the selected pigments into the vehicle and grinding on conventional grinding equipment, such as roller mill, stone mill or colloid mill.

The pigment-non-volatile vehicle ratio can be varied through a very wide range. The higher pigment-non-volatile vehicle ratio will give coatings with a flat finish and the lower pigment-non-volatile vehicle ratio will give a gloss finish. Intermediate combinations will give various degrees of semi-gloss finishes. In order to produce gloss finishes with satisfactory hiding it is necessary to use pigments with maximum opacity, such as pure titanium dioxide. Some of the pigments commonly used are:—

Opaque pigments, Pure titanium dioxide, Titanium calcium pigments, Titanium barium pigments, Lithopone, Zinc sulphide, Inert pigments, Magnesium sili-

cate, China clay, Barium sulphate, Silica, Mica.

A few typical emulsion paint formulae are given below. As previously pointed out, wide variations can be made by selecting various types of resins, oils, emulsifying material, protective colloids, preservatives and pigments. Coloured pigments may be added to give any desired tints.

1

Pure Titanium Dioxide	100	Lbs.
Lithopone	400	,,
China Clay	180	,,
Mica	100	,,
Emulsion Vehicle	620	,,

The emulsion vehicle can be prepared as previously described.

2

Pure Titanium Dioxide	200	Lbs.
China Clay	360	,,
Mica	100	,,
Emulsion Vehicle	620	,,

The emulsion vehicle can be prepared as previously described.

3

Lithopone	475	Lbs.
Zinc Sulphide	183	,,
Diatomaceous Silica	72	,,
Resin-oil Emulsion Vehicle	645	,,

The emulsion vehicle can be prepared as previously described.

4

The following emulsion paint has been used satisfactorily for both interior and exterior use.

Titanium Dioxide (Non-chalking Type)	100	Lbs.
Barium Titanium Pigment	100	,,
Flake Mica	25	,,
Silica	25	,,
Alkyd Emulsion (50% Solids)	400	,,

While linseed oil and ester gum are used in several of the above emulsions, other oils and other resins can be used.

5

Pure Titanium Dioxide	200	Lbs.
China Clay	800	,,
Ester Gum-linseed Oil Solution	72.4	,,
Blown Linseed Oil	98.4	,,
Pine Oil	3.8	,,
Sodium Hydroxide	2.0	,,
Dowicide A	6.5	,,
Lanolin	2.0	,,
Casein	50.0	,,
Water	625.0	,,
Lead Naphthenate (16% Lead)	14.2	,,
Cobalt Naphthenate (4% Cobalt)	3.1	,,

The following procedure in preparation has been found to give good results:—

1. Mix casein in one-half of the water (hot).

2. Add the pine oil to the above mixture.

3. Dissolve the sodium hydroxide and Dowicide A in the remaining water and then add to the casein slurry and mix until smooth.

4. Mix the driers, ester gum varnish, blown linseed oil and lanolin until smooth and add to the casein—sodium hydroxide slurry. Agitate until viscosity increases or there is an indication of the casein swelling.

5. Add pigments and mix until smooth.

6. Grind through roller or stone mill. A loose pass through the mill followed by a medium grind gives better results than a single pass.

Emulsion paints produced on the above formulae can be reduced with half its volume of water for brush application.

—OVERHAULING A MOTOR CAR

APART from repairing actual breakages the work of overhauling an old motor car is an important business of modern times. In most cases of wear of distortion, the proper remedy suggests itself at once to the experienced workman. In many cases the severity of motor car service is such as to require much more careful treatment than would be necessary with other classes of machinery. The following typical instances will be of much interest to readers.

ADJUST THE STEERING GEAR

The steering gear is usually the first part of a car to show wear, owing to the violent shocks it must endure, and the necessarily limited sizes of the various bearings. A common fault in old cars is the loosening of the bolts holding the casing at the base of the steering column to the frame. Unless the steering column is well braced to the dash board, the slightest looseness in these bolts will cause the steering column to shake and the bolt holes to wear large. Tightening up the bolts is but a temporary make shift.

The only permanent remedy is to ream the holes true and fair to the next larger size, and put in bolts that are a tapping fit in the holes. A better remedy where it can be applied, is to brace the steering column. This requires that the dashboard itself shall be rigid. A simple method is to make a brass casting to fit the dash board, having a cored hole ½ inch larger than the steering column. After being put in place, this casting is heated, and babbit metal is run in to fill the space round the column. If the outside of the column turns, thin paper must be wrapped round it to give clearance, and the babbit bearing must be 4 or 5 inches long, and provided with a grease cup.

In case the steering knuckles are found to be worn loose or their pivot bolts, removal is easy if the knuckles are bushed. If, however, there are not bushes, the knuckles may be counterbored and casehardened bushes driven in. These bushes should be casehardened inside only, and copper-plated and wrapped with asbestos before hardening, to prevent their outer surfaces from absorbing carbon. The same treatment may be applied to the ends of the front cross link; or the holes may simply be removed true, and pins made and casehardened to fit them. New pins should be provided with oil covers, or, better, small grease cups and these should feed to the centre of the bearing.

LEAK IN RADIATOR

A radiator may be repaired, if the leak is outside, by emptying it and laying it flat so that the solder, during the repairing, will not flow away. To prevent adjacent seams from opening from the heat, they may be kept cool by means of pads of wet waste.

NEW CRANK-SHAFT BUSHES

Quite possibly the crank pins of the engine under consideration are oiled by splash from above, through holes drilled in the upper half of the connecting rod. If so, the repairer has a good opportunity to prolong the usefulness of the next set of bushes by leaving the upper half entirely plain, and feeding the oil from beneath by means of copper or steel scoops sweated into the bottom caps of the rods. These scoops should be about ¼ inch inside diameter, and shaped to dip squarely into the oil. Short oil grooves should lead crosswise from the oil hole in the

centre of the bushing; but these grooves should extend no more than half way to the edge of the bushes so that the oil will not be able to escape from the bearing without doing its part of the work.

In handling connecting rods with scoops fitted, care must be taken not to bend the end of the scoop by an accidental blow, as this would result in a cut of bearing. The reason for leaving the upper half of the bushes plain is that, under pressure, oil squeezes out from a bearing instead of working into it and grooves in the pressure side will permit the oil to escape at the every moment when it is most needed.

WEAR OF PISTONS AND CYLINDERS

The piston rings sometimes become leaky before the pistons have ceased to be a fair fit in the cylinders; consequently, replacement may be the only thing needed. In time, however, the cylinder wears barrel-shaped and the piston also wears, with the result of too much oil working up past the pistons until a noticeable click is produced at each explosion by the rocking of the piston. When this point is reached, the cylinder must be reground, and a new piston turned to fit.

SAGGED FRAME

A motor-car frame is, after all, nothing but a spring, and it sags more or less, according to the load. In time the shocks of travel may produce a permanent set in the side members, to compensate for which the motor and gear case should be lined up anew. It is a good plan when doing this to load the frame in same manner to about its normal load. If the sag is small, it is usually corrected by putting liners under the rear feet of the engine and the front foot of the gear box. Exact alignment is unnecessary, if the clutch and gear box are connected by a short shaft having a universal joint at each end. If, however, there is only one universal, or none at all, fairly exact alignment is necessary. An approximate list can be made by opening all the compression cocks and turning the crank slowly with the clutch engaged, to show whether there is binding at any point.

If the frame has sagged so much that liners used will not correct the trouble, apply truss rods underneath the frame. The truss rods, according to the size of the car, may be from $\frac{3}{8}$ to $\frac{1}{2}$ inch in diameter, and the streels may be from 4 inch to 6 inch high.

BALL BEARINGS LOOSE IN GEAR CASE

Annular ball bearings set directly into an aluminium crank, cases are liable in time to hammer their aluminium seatings until the outer races are loose. This can be avoided in some cars by setting the bearings in bronze cages. In case a ball bearing works loose in aluminium, the best remedy is to counterbore the aluminium about $\frac{1}{8}$ inch larger each side, and machine a flanged bronze ring to fit the aluminium as snugly as possible.

FILLETS ON SQUARE-ENDED SHAFTS

It is quite common for the shafts in line rear axles of the floating type to engage the differential gears by having square bolts nulled of the shaft ends. Quite possibly the outer ends of the shafts may engage driving plates in the wheel heels in the same manner. The best modern practice is either to have the shafts enlarged, so that forming a square or hexagonal of it does not reduce its section below that of the end portions of the shaft, or to forge a disc on the end of the shaft with bolt holes or clutch claws on it, the purpose of each construction being to apply the driving force at a greater distance from the centre of the shaft. If, however, the shaft is not en-

largest it is very important that the change from the reduced square to full circular section be gradual, not abrupt. An abrupt shoulder at this point concentrates the fibre stress, and results in the shaft eventually breaking under strains which it would have easily endured if large fillets are provided instead of a square shoulder. The same thing applies to hexagonal ends. If the shaft is taken out in the course of overhauling, fillets can easily be put in by means of an emery wheel.

WELDING CRACKS IN ALUMINIUM CASTINGS

Briefly, process consists in chipping a triangular grove of the width and depth of the crack, and filling this grove with molten aluminium, flowed into it under the heat of the oxy-acetylene blowpipe flame. The same process is applicable to repairing cracked water jackets and occasionally cylinders, as repairing damage of various sorts to wrought-iron and steel.

REFITTING THE DIFFERENTIAL

The hardest part of the differential to lubricate and the likeliest, therefore, to wear out soon, is the "spider", on which the four small level pinions are carried. The spider is usually case-hardened; the pinions may or may not be bushed. Holes are usually drilled in the pinions, through which oil is worked by the rolling of the teeth. If, however, the user makes the mistake of using grease to lubricate his differential, the repairer is likely to find the bushes of the small pinions have been cut to pieces, owing to the grease refining to enter. The journal portions of the spider are also likely to have damaged. If the pinions are bushed, the user is fortunate, for new bushes are easily purchased; and, even if the spider must be ground to true at up, special bushes to fit the new diameter of the spider will not be expensive. If there be no bushes, both pinions and spider must be replaced.

RE-RIVETING AN OLD FRAME

Most of the frames made to-day are as strong in the riveted joints as elsewhere. Occasionally, however, one may find a frame which through long service has loosened joints, and must be re-riveted to make it sound. This involves dismantling the whole car and taking the frame close to a forge, as the riveting must be alone hot to be secure. Before riveting, the holes should be reamed to make sure that they line up evenly and are the proper size for the rivets selected. The frame parts must be carefully cleaned after the old rivets have been cut out, as dirt between the surfaces will spoil the tightness of the job.

TAKING UP PLAY IN IGNITION AND CARBURETTOR CONNECTIONS

In few cars are the ignition and carburettor connections so carefully made that they do not work loose after the car has run a few thousand miles. When that point is reached, either the operator must depend on guesswork and knock when running slowly, or springs must be attached to take up the slack and exert constant pressure in one direction. The latter expedient is simple and in most cases sufficient. However, a first class job can be done at small expense by purchasing the ball-jointed rod-ends manufactured for the purpose.

—THE COIR INDUSTRY

THE coir industry is the most important industry in South India. It is both a cottage industry and a factory industry. As a cottage industry, it provides livelihood to a large number of people residing on the sea-coast.

Coconuts are husked as soon as they are felled, the nuts are broken, dried and the copra taken for export as such and for expressing the oil so much in demand. The husks are carried to retting areas for soaking and extraction of fibre. The husking is done by jabbing the stem end of the fruit on the end of a sharp stake of iron or hard wood fixed at an angle in the ground, say at about 30° to the vertical. The point penetrates between the husk and the shell and with a sharp twist the husk is loosened so that with three jabs the husk is completely separated. Trained hands can usually deal with 1500 nuts in a day of 8 hours.

The husks are carted as soon as possible to the retting areas for being soaked in water. Delay in soaking causes the husks to dry giving to the fibre when extracted a permanent brown colour which lowers the value of the produce.

RETTING

The process of retting consists in steeping the husks in water and allowing them to remain in that condition for a period of about a year, i.e. till it is in a condition to be treated for the separation of the fibre. During process of retting adopted the water in which the husks are steeped is subjected to periodical change. Generally the change of water is brought about by the action of the slight rise and fall which daily occurs in the backwaters. There are no doubt variations adopted in the method of retting depending on the locality. The husks are usually placed:—

(1) In staked enclosures in shallow water.

(2) In nets in the backwaters where the depth is not too great.

(3) In submerged fields close to canals or backwaters having connection with them.

(4) In pits in sandy soil and close to the channels. The sandy soil permits the entrance and exit of water by percolation.

The water used for retting is invariably saline although some people believe that the process of retting is possible even in pure water. Husks are steeped for retting all the year round; only those remaining in water during the rainy weather take a longer time before they are ready than those under water during the hot weather. The reason is attributed to the greater salinity of the water and the higher prevailing temperature.

The coir net is placed in water and then filled with the husk. In some places 1500 to 2000 husks are put in a net while in other places large quantities say 5000 to 6000 are put in. When the net is filled with the husks it is covered with coconut leaves and earth and a day or two, after placing in water they are weighted with stones, clay or other substances and fully sunk. In this condition they remain till they are taken out for sale. About 30 days after immersion a smell of sulphuretted hydrogen becomes noticeable near the soak, the mass of husk becomes appreciably warmer and the water appears to become more turbid and a scum forms on the surface. About 4 or 5 months after entry in water the gas formation, turbidity, temperature and smell increase; but after 6 months the water becomes clean and gas and smell ecolution appear to diminish.

EXTRACTING THE FIBRE

After removing the nose fibre as it is called, i.e., the short fibre near the stem end of the nut and the outer cover of the husk with the hand, the husk is placed one by one on a block of stone and beaten with a hard wooden rod. The wood is generally the heart wood of the tamarind tree. Pith and other matter in the husk fly to the sides during the beating and the fibre alone is left behind. After beating with the wooden rod the thicker and coarser fibres are removed by hand, leaving the finer fibre which goes forward for spinning.

The finer fibre thus obtained is now allowed to dry and is willowed by being treated with a long stick by beating and throwing up. This mixes up thoroughly the long and short fibres and removes most of the remaining pith. The willowed fibre is then combed on a combing machine. It consists of a drum in which an iron shaft carries a number of blades with saw teeth cut on them and it is mounted on a frame work. At the top and bottom frames supporting the drum there is a set each of stationary blades similar to the revolving blades on the drum. The drum is rotated and the willowed fibre fed by hand at one side and taken out at the other. This process of combing smoothens and lays the fibres more or less parallel and removes the last trace of pith in them.

SPINNING

When the fibre is thus dried and cleaned it is used for spinning which process is done generally in a spinning wheel. The process of combing is done away with in the latter case. The usual practice there is to roll the fibre into the short lengths giving a clockwise twist. When a sufficient quantity is made these short lengths are again twisted in a counter clockwise direction thus making a two strand yarn. A gentle breeze helps the spinning and with such a breeze blowing the spinning of the yarn is an easy process.

For spinning on the wheel, two wheels are required; one a stationary wheel two spindles and the other mounted on wheels carrying only one spindle. Three persons are required to form a squad, a little boy or girl to turn the stationary wheel and two elderly persons either men or women to make the two strands that go to make up the yarn. Each spinner takes a bundle of fibre and keeping it under his or her armpit starts from the fixed wheel and walking back deals the fibre to get the required thickness for the strand. The wheel in the meanwhile is turned by the boy or girl to give the necessary twist to the strand. When a length of about 50 or 60 feet, in some places this is about 80 feet, is made the ends of the strands are hooked to the single spindle on the movable wheel. The rotation of the fixed wheel is stopped and the movable wheel gently twisted and a traingular piece of wood with grooves on either side to take the strand is held between the strands to prevent knots and kinks forming and to regulate the counter-twist of the strands. As the yarn is made the movable wheel moves nearer the fixed wheel. The yarn thus made is either sold to the nearest agent or sent to the coir market.

MATS AND MATTINGS

The next stage in the coir industry is the weaving of mats and matting, the two important products of export. The chief feature which enables even small capitalists to enter the field is the entire absence of any power plant except the one used for shearing door mats. The looms are all hand looms and fairly cheap. A loom costs only about Rs. 60, while a rolling

machine costs Rs. 200 and a beaming machine Rs. 450.

Coir matting is made in various qualities. The rolls are usually made of 50 yards length and weigh about 120 lbs. All standard widths are made up to 6 feet. Fine design and patterns are also made by the expert weavers. The looms are all massive hand looms and the methods are similar to those used in cotton weaving.

DOOR MATS

Brush door mats are usually made from spun yarn usually beach and for better grade, Vaikam. The yarn for the pile is woven into the mat by winding the required number of strands on a grooved rod of the necessary height across the mat. A knife is then run along the groove at the top, which leaves a pile and it is held in place by the weft across the warp. These mats are bleached in a special bleaching chamber. Chain mats are also made with plaited yarn made by hand and at time in the machine. The links are then stitched together.

FIBRE MATS

These are superior mats and are made direct from the fibre without being spun into yarn. They are made both plain and fancy. In such mats the 'takes' of fibre as they are called are all inserted upon the warping by hand. When fancy mats are woven, the insertions follow a pattern either before the weaver, or which is known to him. The process of weaving is evidently slow and the fibre mats in consequence are costly. Very fine and attractive pattern are made with fibre mats. After weaving the mats are all sheared in the machine. The fibre mats have however to be subsequently trimmed with a pair of scissors to give the pattern a good relief.

DYEING

Whenever coloured and fancy patterns have to be made, the yarn and fibre in the case of fibre mats, are dyed in boiling water, or steam of which latter process is generally preferred. Coir does not dye satisfactorily. But all the same it is done on account of the demand for coloured designs. All dyeing is practically done with aniline dyes. Aloe fibre is also used occasionally for fancy purposes where white yarn is required.

Prevention of Corrosion of Metals

AN important development in the prevention of corrosion which should benefit the export trade of Great Britain was described by Dr. W. H. J. Vernon, of the Chemical Research Laboratory, Department of Scientific and Industrial Research, Teddington, when delivering the second of two Cantor lectures on the corrosion of Metals at the Royal Society of Arts. The first lecture emphasized the economic importance of the subject and described some of the principal causes of corrosion.

The second detailed various preventive methods. In discussing corrosion inhibitors, Dr. Vernon referred to recent researches at the Chemical Research Laboratory in which inhibitive properties of sodium benzoate had been established and applications worked out.

The development of sodium benzoate as an inhibitor originated in war-time work on anti-freeze solutions for use in the cooling systems of automobile engines. It was discovered that while it is an effective anti-freeze agent it also possesses the outstanding property, when added in small propertions to solutions of glycol, of inhibiting the corrosion of metals in the cooling system.

Work at the Chemical Research Laboratory has applied this discovery to wrapping materials which do not merely exclude humid or polluted atmospheres, but have the more positive effect of preventing attack on the underlying metal if the wrapping is defective. This has been achieved by impregnating the wrapping material with sodium benzoate. Steel specimens in these wraps remain bright in conditions of high humidity, even if the wrapping becomes soaked with precipitated moisture. Sodium benzoate is a "safe" inhibitor; that is, if the concentration falls below the inhibiting percentage it does not induce corrosion and localised pitting. Other advantages are its compatibility with other organic substances and its power of resisting mould growth, particularly useful in tropical climates.

The first wrappings investigated were cellulosic materials but a more recent and very promising development resulting from collaboration with the Rubber Producers' Research Association uses rubber latex with sodium benzoate added to it.

Simple dipping of the article in the treated latex at ordinary room temperature produces a protective coating which has good mechanical properties combined with that of corrosion prevention. Large articles can be sprayed with equally good results. The coating covers the whole surface of the article, even small interstices, but can be readily peeled off when no longer required. Stripping can be made easier by incorporating a tape in the coating. The metallic surface underneath the coating remains bright even after exposure to drastic conditions of humidity and moisture precipitation. If no benzoate is used, rusting quickly develops beneath the rubber film in the same conditions. Other emulsions besides latex can be used with the benzoate, including synthetic rubbers.

The method, which is covered by provisional patents in Great Britain, Canada, and the U.S.A. (Nos. 12487, 48734, 579454) is based entirely on British products. Amongst obvious applications is its particular suitability to the protection of machined metal surfaces where conditions of storage of transport are poor.

PHARMACEUTICAL RECIPES

AMMONIATED TINCTURE OF QUININE

Quinine sulphate	175	gr.
Ammonia, fort	2	fl. oz.
Alcohol (60 p.c.)	18	"

Mix the ammonia with the alcohol. Then add the quinine sulphate. Shake until a clear solution is produced. Set aside for 3 days and filter.

SYRUP FERRI IODIDE

Iron, in wire	105	gr.
Iodine	289 4/5	"
Distilled water	1 fl. oz. 96	mins.
Glucose, by weight	1 oz. 262½	gr.
Syrup, by weight to produce	16	oz.

Shake the iron and iodine with 384 mins of the distilled water in a flask, cooling if necessary, until the reaction is complete; add the glucose, heat on a water bath for 5 minutes, mix, filter while hot into a tared vessel containing part of syrup. Rinse the flask and warp the filter-paper with the remainder of the distilled water heated to boiling, and make up to the required weight with the syrup.

PINE INHALANT

Menthol	2	gr.
Pine oil	160	min.
Lavender oil	80	"
Cinnamon oil	30	"
Origanum oil	144	"
Eucalyptus oil	120	"
Liq. Formaldehyde	40	"
Spirit Vini rect.	8	oz.

Mix.

QUEEN BALM LINIMENT

Camphor	2	oz.
Myrrh	2	"
Guaiacum	1	"
Capsicum	2	"
Sassafras oil	1	"
Hemlock oil	1	"
Alcohol, 90 per cent	128	"

Macerate with occasional agitation for 7 days, then filter.

Apply freely to the affected parts by means of flannel. This is very satisfactory for bruises, sprains, frostbites, and rheumatism.

SULPHUR LOTION

Zinc oxide	1	ounce.
Precipitated sulphur	4	drams.
Glycerine	1	ounce.
Rose water to make	20	ounces.

Mix the zinc oxide and precipitated sulphur with the glycerine in a mortar, and to this add the rose water. Transfer to a bottle, and wash out the mortar with the water.

The lotion may be coloured with a few grains of carmine triturated along with the zinc oxide.

PILES OINTMENT

Tannic acid	40	gr.
Morphine	4	"
Oleic acid	30	"
Lanolin	120	"
Soft paraffin to make	1	oz.

Mix.

BORAX HONEY

Purified borax, in powder	1	oz.
Glycerine, by weight	½	"
Purified honey, by weight	8½	"

Mix one by one in the order given in the recipe.

EFFERVESCENT EPSOM SALTS

Magnesium sulphate, in crystals	50	grams.
Sodium bicarbonate, in powder	36	"
Tartaric acid, in powder	19	"
Citric acid in powder	12.5	"
Refined sugar, in powder	10.5	"

Dry the magnesium sulphate at about 55°C. until it has lost 25 per cent. of its weight, powder the dried product, mix it with refined sugar, and then with sodium bicarbonate, tartaric acid and citric acid. Place the mixture in a dish or pan heated to between 90° and 105°C. When the mixture, by the aid of careful manipulation, has assumed a granular character, separate it into granules of uniform and convenient size by means of suitable sieves. Dry the granules at a temperature not exceeding 55°C. The product weighs about 100 grams.

PEPPERMINT TABLETS

White stearine	10	parts.
Alcohol	45	"

Mix thoroughly and dissolve.

Gelatine	3	parts.
Hot water	60	"

Dissolve these, and add with the alcohol stearine solution.

Icing sugar	1000	parts.

Rub the paste through a fine sieve, and dry by exposing to warm air. Sift again and add:—

Peppermint oil	3	parts.

Keep the mass in well-fitting tins preferably for 24 hours to enable the peppermint to permeate thoroughly.

—Recipes for Small Manufacturers

WASHING POWDER

Hard soap	5	lbs.
Soda ash	3	„
Silicate of soda	2	„
Borax	1	lb.

Dry each substance separately and then reduce it to fine powder. Then mix all together by sifting.

CURING RABBIT SKIN

Stretch the skin and tack it tightly on a board; scrape off all the fat with a blunt knife, and also remove as much of the congealed blood as possible. Now soak a rag with strong acetic acid (33 per cent., but no stronger) and rub it well into the skin, going into every nook and corner. Set aside to dry for one or two days, then repeat the acid dressing when this second dressing is thoroughly dry, apply a 10 per cent. solution of ammonium sulphate with a good sized paint brush, and apply similarly a 10 per cent. solution of washing soda. The ammonia then liberated slowly neutralises the acetic acid in the skin. This process is repeated the next day, then, after two days, the skin is raised under the tap, while still tacked on the board, using the hand to cause the water to penetrate. Set aside to drain, and then dry slowly in a warm room, but not against the fire. Finally when dry, rub well with either benzoated lard or linseed oil.

FUMIGATING PASTILLES

Pastilles are made by powdering the gums, adding the charcoal and potassium nitrate, spraying on the essential oils and finally massing with a mucilage of either gum acacia or tragacanth. An example follows:—

Siam Benzoin	100	grams.
Tolu Balsam	50	„
Charcoal	700	„
Saltpetre	50	„
Sandalwood oil	50	c.c.
Patchouli oil	50	„
Cascarilla oil	30	„
Grain Musk	5	grains.
Mucilage of acacia	as	required.

ROUGE STICKS

Rouge sticks are very similar to lip sticks but these are slightly greasy and softer than the latter. The ideal lip rouge will rub on smoothly and does not come off easily. The carmine content should not exceed 20 per cent. but the majority are made with much less. If a bright colour is desired, it can be obtained by the addition of zinc oxide.

Liquid paraffin	300	c.c.
Lanolin anhydrous	150	grams.
Ceresine (high m p.)	350	„
Carmine	200	„
Linalyl cinnamate	1	c.c.

CHEWING GUM

White wax	1	part.
Paraffin	1	„
Tolu balsam	4	*parts.*
Benzoin	1	part.
Sugar	1	„
Flavouring matter		q.s.

Melt the gums, etc., together, and, when fluid, stir in the sugar and flavouring matter. When cool enough, roll into sticks or cut in dies.

SILVERING POWDER

Silver chloride	3	parts.
Sodium chloride	3	„
Prepared chalk	2	„
Potassium carbonate	6	„

Moisten the powder with water to form a paste and apply to the article to be silvered by means of a piece of cloth.

CANVAS SHOE DRESSING

Zinc oxide	2	oz.
Pipe clay	4	„
Bleached shellac	3	„
Borax	1	„
Sugar	2	„
Glycerine	1	„
Boiling water	10	fl. oz.

Dissolve the borax in the boiling water, add the shellac. Continue the heat until the shellac is dissolved. Then remove from the fire, add sugar and glycerine; stir in the pipe clay and zinc oxide.

GRAFTING WAX FOR TREES

Japan wax	1	part.
Beeswax	3	parts.
Rosin	8	„
Oil of turpentine	4	„
Hard paraffin	1	part.
Suet	3	parts.
Pine resin	6	„

Melt the waxes along with resin, and while hot add the hard paraffin to it; then stir in the turpentine oil and pine resin and pour the mixture in a stone slab.

SHAVING SOAP

Tallow	250	parts
Coconut oil	125	„
Lard	25	„
Caustic soda lye 30°Be	275	„
Caustic potash lye of 20°Be	75	„
Oil of lavender	1	part.
Oil of thyme	½	„
Oil of cumin	½	„

Melt together tallow, coconut oil and lard and allow the mixture to cool off to 115°F. Then add the caustic soda lye and caustic potash lye with gentle stirring and perfume the soap with the oils stated above. Set aside for a day then cast into sticks by means of moulds.

—IN THE FIELD OF INVENTION

MANUFACTURE OF ACTIVATED CARBON

A new method of producing activated carbon employing hydrochloric acid gas and the oxychloride of an alkaline earth as an activator has recently been patented (British Patent No. 630, 836, Industrial Chemist, 1950, 26, 39).

The carbonaceous material is intimately mixed with magnesia which is obtained by calcining the carbonate, hydroxide, nitrate or an organic salt of magnesium at a temperature below 800°C. Sufficient magnesium chloride solution of 27° to 32°Be. is then added to the mixture so as to form a firm dough.

The dough is next flattened to a slab of convenient thickness, which is dried in the air from 1 to 3 hr., subdivided and allowed to set. On a large scale, bricks may be formed in a clay pug mill of the extrusion type, while in the laboratory the small blocks are heated to between 650°C in a crucible having one escape vent for vapours in the lid.

After heating, the blocks or bricks are crushed to powder, extracted with hydrochloric acid solution, filtered and washed free from salt solutions and hydrochloric acid with water. The material is finally treated with dilute ammonia to neutralize residual acidity. Traces of ammonia are removed by drying below 100°C., leaving a carbon with high powers of decolourisation and gas absorption.

—Journal of Scientific & Industrial Research.

UREA-FORMALDEHYDE FERTILIZER

The development of a new urea formaldehyde compound as a source of nitrogen for tobacco fertilization is reported (Chem. Age, 1950, 62, 263).

Urea-formaldehyde ("ureaform") in combination with cotton-seed meal results in 16 to 23 per cent increase in grading and yield over cotton-seed meal alone. The combination material has an advantage over urea which produces too dark a colour in the tobacco leaf because of the rapid rate at which it releases ammonia. In comparison with cotton seed meal, 4 per cent less dark leaf colour was produced with the urea form-cotton-seed meal treatment. A treatment consisting of a mixture of 25 per cent cotton-seed meal gave best crop value.

NEW ARC-WELDING ELECTRODE

A new electrode, manufactured in Australia, is especially suited to work on single pass horizontal fillets and multiple pass fillets in the vertical and overhead positions. It is also designed for work on vertical, horizontal and overhead butts in plates over half an inch thick. The electrode is an aid to faster welding and also possesses very low spatter loss, inherent self-cleaning properties, and gives an excellent appearance to the finished weld (Tech. Newsletter, Australia).

LIQUID BOTTLE CAPS

Harefield Industrial Paints Ltd. call the attention of readers to their "Dunk" Liquid Cap Seal, a cellulose acetate solution formulated to form a cap-seal over the corked necks of bottles. It can be applied by machine or by hand, the principle of application in each case being the same, the bottle being dipped and slowly extracted. The drying time is rapid, but can be adjusted to suit customers' requirements, and all colours, opaque and transparent are available. The solution contracts on drying and forms a handsome cap-seal which cannot be replaced when once removed. This seal is noninflammable, and is impervious to moisture, oil and alcohol. Durability, especially under tropical conditions, is an outstanding characteristic. "Dunk" Liquid Cap Seal is sold in gallon cans and costs a fraction of a farthing per seal. The makers also send us details of an automatic bottle capping machine specially designed for use in connection with these liquid cap seals. This machine has a rotating circular platform driven by a h.p. geared electric motor, a series of eight dipping cups being fitted at regular intervals to the outer edge. Alongside each cup is a vertical arm fitted with a suitable device for holding the bottles. In the middle of the platform is the main feeding container, which holds 1 gallon of the Dunk Liquid Cap Seal, this supply being fed through tubes controlled by stop valves to the cups. The output of the machine is 480 bottles per hour.

—Perfumery and Essential Oil Record.

NEW PROCESS FOR REFINING CAUSTIC SODA

A new process for refining caustic soda, or lye, was described by Walter L. Badger. A common method of making solid lye is by drying a 50 per cent. solution with the aid of steam heat at moderate temperatures. According to Badger and his collaborator, David J. Pye, their new process consists of evaporating the 50 p.c. solution to near-dryness, at a temperature of about 700°F. using Dowtherm vapour to supply heat.

The principal problems which had to be met were corrosion of equipment and contamination of the lye product. By giving the 50 p.c. solution a chemical treatment to remove impurities and then evaporating in equipment made of nickel, they were able to make a product of high purity without excessive corrosion of equipment.

This process, representing the results of nearly 20 years of study and experimental work, is covered by new patents or patent applications. Feasibility of the process for large-scale production has been demonstrated in a small plant producing continuously at the rate of 60 tons per day.

—International Chemical Engineering and Process Industries.

FORMULAS, PROCESSES & ANSWERS

CASEIN PLASTICS.

378 J.I.C., Vijayawada—Desires to know a good process of manufacturing casein plastics.

Large amounts of casein are used in the preparation of galalith or artificial horn. This material is used daily in large quantities in the manufacture of pencils, buttons, jewellery, and novelties of all sorts. Rennet casein must be used in the manufacture of plastics.

A batch of casein is weighed out into a dough mixer, where dry pigment is added at this stage. Then about 40 per cent. of its weight of water and 25 per cent. glycerin are poured and mixed intimately.

The casein is plasticised with the addition of glycerin, as plasticizing agent, and heat in special extruding presses from whence it is ejected in the form of rods. These rods may be pressed under platens and fused together into sheets. The rods and sheets are then hardened by immersion in a bath of formaldehyde of varying strengths and for periods of time dependent on the size of rods and sheets. The rods and sheets are then machined into the desired articles. Many variations to the above process are in use, but in general the one above is followed. Casein takes a very high polish and may be polished by dipping in a solution of warm sodium hypochlorite for a few minutes.

The material is first subjected to buffing when necessary. It is then placed in a solution of 2 per cent. sodium hypochlorite at 70°C to which a little caustic soda has been added. After three minutes it is washed in warm water and rinsed. The surface is soft when the articles have been removed from the bath, but sets to a hard gloss when dry. When allowed to dry a brilliant polish has been acquired. It is claimed that this finish gives improved water resistance. In some cases the articles are finished off by being subjected to a tumbling process with wax and wooden pegs.

LICE KILLER.

467 S.V., Lucknow—Wants to have good recipes of lice killer, digestive pills, etc.

Sulphur	1	oz.
Carbolic acid	½	"
Crude naphthol	1	"
Chalk powder	1	lb.

Mix.

DIGESTIVE PILLS.

Refined sugar	30	parts.
Saccharated Pepsin	45	"
Subnitrate bismuth	60	"
Pancreatin	45	"
Mucilage of gum acacia	35	"
Ginger, powdered	30	"

Mix and divide into 5 grains pills.

INSULATING TAPE.

Carnauba or montan wax	40	parts.
Rosin	32	"
Castor oil	15	"
Carbon black	8	"

Melt the wax and rosin and then add the castor oil. Lastly thoroughly incorporate the carbon black, while the mixture is still hot treat the tape by simply dipping for a few seconds.

WOOD PRESERVATIVES.

I.

Sodium dichromate	20.6	parts.
Arsenic acid	55.9	"
Zinc oxide	12.8	"
Zinc chloride	10.7	"

This is dissolved in water before use and the wood is impregnated with it.

II.

Potassium dichromate	34	parts.
Copper sulphate	30	"
Chromium acetate	6	"
Boric acid	30	"

Mix. Use as above.

TURKEY RED OIL.

Turkey red oil or alizarine oil is prepared by acting upon castor oil at about 40°C with concentrated sulphuric acid. The treatment consists in running into the oil, slowly and with continued stirring, 20 per cent. of 66°Be sulphuric acid, the operation being performed in a lead lined iron vessel kept cool by means of ice water. After leaving at rest for two or three hours, the mass is gradually thinned down with water and further diluted by stirring in a thin stream of lukewarm soda solution, about 3 times crystallised soda to each measure of acid used being employed. The finished product settles out on being left overnight.

The product, which is either completely soluble in cold water or readily emulsifiable, is employed in dyeing.

The reactions which take place are complicated, and the sulphonated oil contains a mixture of several substances.

BLACK SALT

505 P.L.A., Jhansi—Wishes to have a process of making black salt.

To manufacture black salt mix 56 lbs. rock salt or Sambhar salt with 20 oz of dried emblic myrobalans, put ¼ of these materials into a round earthen pot with a narrow mouth, which is put in a fire place made of clay. The fire-place has a hole at the bottom for introducing the firewood After the fire has been lighted about an hour, and the materials in the pot appear to be heated, the rest of these materials are added by degrees The whole is then exposed to a strong red heat for about 6 hours. The fire is then allowed to die away, and the pot to cool, which upon being broken is found to contain about 48 lbs black salt

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TRANSPARENT ADHESIVE FOR CELLULOID

516 M J, Gujranwala—Wants to know a good recipe of transparent adhesive for celluloid.

Isinglass (fish glue)	50	parts.
Gum ammoniac	4	"
Gum mastic	2	"
Alcohol, 95 p c	10	"
Water		q.s

Soak the isinglass in cold water overnight, or until it has become swollen and soft throughout In the morning throw out any superfluous fluid and throw the isinglass on a clean towel or other coarse cloth, and hang it up in such a way that any free residual water will drain away. Upon doing this thoroughly depends, in a great measure, the strength of the cement When the gelatin has become thoroughly drained put it into a flask or other container, place it in the water bath and heat carefully until it becomes fluid being careful not to let it come to a boil, as this injures its adhesive properties (the same may be said in regard to glues and gelatins of all kinds). Dissolve the gums in the alcohol and add the solution to the gelatin after removing the same from the water bath, and letting it cool down to about 160°F Stir well together or mix by agitation.

SOAP LIKE SUNLIGHT

532 K S S S. Amritsar—Desires to know a process of making soap like sunlight

Cotton seed oil	144	lbs
Tallow	60	"
Coconut oil	120	"
Rosin	60	"
Caustic soda lye 44°Tw	283	"

Place fats and rosin in a capacious iron pan and apply heat. When melted add the caustic soda lye with vigorous stirring Boil until the saponification is complete Add water from time to time to break up the grains Then scatter salt over the mass and keep aside for 4 hours. Next run out the liquor The soap thus left aside is then melted by applying gentle heat and run into frame.

SOAP CHIPS

In obtaining soap chips first of all make good hard soap with tallow and coconut oil in the usual method of soap making. Then cut into small blocks and keep aside to dry in a special drying chamber or in air. Then cut the blocks in thin slices in a chipping machine. Spray lemongrass oil and cassia oil in equal proportion.

COFFEE BEANS ROASTING

550 M. S. Cuttack—Desires to know a method of roasting coffee beans.

Before roasting the beans after being husked are sorted. They are then put into a revolving cylinder The beans are then carefully roasted by gradually heating the cylinder. During this time the cylinder is made to revolve. The heating is continued until the aroma is well developed and the toughness destroyed. Too much heat is avoided. as the volatile and aromatic properties of the coffee, and. consequently the flavour, are thereby injured; whilst on the other hand, if the berries are roasted too little, they produce a beverage with a raw green taste, very liable to induce sickness and vomiting. When properly roasted, coffee has a lively chocolate brown colour, and should not have lost more than 18% of its weight by the process. If the loss exceeds 20% the flavour suffers in proportion The roasted coffee should be placed in a very dry situation, and excluded from the air as soon as possible because it loses flavour by keeping and also powerfully absorbs moisture from the atmosphere.

After roasting, while still hot, sprinkle over it pulverised sugar. stir it well. sprinkle on some more, and then put it up for keeping in well closed receptacles. The coffee looks as if coated with varnish. and even if kept for a long time suffers no loss of aroma

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ALUM BLOCK

576 K S, Aligarh—Wishes to learn a method of making alum block.

Dissolve 100 oz of alum in small quantity of water Add to it 1 oz of menthol dissolved in a little spirit and mix with 1 oz. of glycerin. Then heat the mixture on a water bath to evaporate the water As soon as almost the whole of water has been evaporated, pour the hot mass into rectangular moulds and set aside to crystallise After a day or two take out the blocks and rub their surfaces with hot water to make them smooth.

ESSENCE OF ORANGE

578 R C P, Hoshiarpur—Wishes to have recipes of essences of orange, grape, etc

Pineapple ether	200	parts.
Oil of sweet orange	100	"
Alcohol	700	"

Mix.

GRAPE ESSENCE

Ether	10	parts.
Glycerin	10	"
Tartaric acid	5	"
Succinic acid	3	"
Acet Aldehyde	2	"
Chloroform	2	"
Formic ether	2	"
Methyl salicylic ether	1	part.

Mix.

SODA ICE CREAM FLAVOUR

Vanillin	20	oz.
Coumarin	12	„
Alcohol 90 p.c.	2	gallons.
Glycerin	1	gallon.
Water	1	„

Mix. One ounce of this mixture will flavour 5 gallons.

DYEING COTTON WITH INDIGO

609 R.P.H., Gubalgudd—Desires to know a method of dyeing cotton with indigo, and also dyeing with sulphur colour. etc.

Dyeing cotton with indigo is based on the fact that indigo white or "indigo vat" has an affinity for textile fibres. The indigo white is obtained by the action of sulphuric acid on indigo. The cloth is immersed in the vat and the colour is then developed by hanging the dyed fabric in the air. Alkaline sodium hydrosulphite is principally used for the preparation of the vats. For cotton dyeing caustic soda can be used as the alkali, but with wool and silk too high a concentration of free alkali is injurious to the fibre, and ammonia mixed with a little caustic alkali and a protective agent such as glue is used.

PRINTING OF VAT DYES

Indigo is used for dyeing all fabrics in fast blue shades and also largely in printing. For the latter purpose and for the printing of vat dyestuffs generally, two main methods are employed: (i) Glucose Process. The calico, or similar fabric, is treated with glucose and then printed with a mixture of indigo and caustic soda in the form of a paste. The fabric is then heated by means of steam, whereby the dye is reduced and fixed by the fibre, subsequently being oxidised. (ii) "Rongalite" Process. On account of its ease of oxidation, sodium hydrosulphite is of less value for printing purposes than its compound with formaldehyde, $H.CH(OH).OSONa.2H_2O$. This is known as "Rongalite" (BASF), and is prepared by direct combination of formaldehyde and hydrosulphite in the presence of alkali or by reducing the bisulphite compound of formaldehyde (Ber., 1905, 38, 1057, 1069). It is hydrolysed by steam into its components. It is applied to the fabric together with the dye, an alkali or alkali carbonate and a protective colloid such as gum, the fate of the dye being the same as in the glucose process. If a pattern with an oxidising agent, such as a chromate, is simultaneously printed on to the fabric, the Indigo will be oxidised locally to satin, which may subsequently be washed off, giving a white pattern on a blue ground ("discharge effect").

DYEING COTTON WITH SULPHUR COLOURS

The cotton fibre may be dyed with sulphur dyestuffs from their solutions in sodium sulphide. The dye solution is made by dissolving 2 grammes of the dyestuff in 40 c.c. of hot 10 p.c. sodium sulphide solution (60 c.c. for blacks), cooling, and diluting to 200 c.c. The correct amount of this solution—generally equivalent to 5-12 per cent. of dyestuff, as the tinctorial value is low—is pipetted into the dye-bath and diluted to make a "30: 1 liquor", e.g. to 150 c.c. for 5 grammes of cotton. 2.5 per cent. of sodium carbonate is added to the bath and dyeing is carried out as in the case of the direct cotton colours, up to 40 per cent. of sodium chloride being added to assist exhaustion. Dyeing is carried out generally at 80° for one hour, but some sulphur colours are better applied at lower temperatures. It is essential that, after dyeing, the cotton should be thoroughly washed before drying.

The fastness of the sulphur colours may be increased by after-treatment with chromium or copper salts, which frequently changes the shade.

Cloth dyed with sulphur blacks is often after-treated to prevent tendering by the sulphuric acid subsequently formed on the fibre. For this purpose a treatment with dichromate and acetic acid, followed by a rinse in alkali, is used.

The shade of several sulphur colours is brightened by after-treatment with sodium perborate, which produces the same effect as would prolong oxidation in air.

SODIUM HYDROSULPHITE

613 P.S.B., Ootacamund—Wants to have a process of preparing sodium hydrosulphite.

To prepare sodium hydrosulphite take 100 parts of sodium bisulphite solution (Sp. gr. 1.358) and dilute it with 225 parts of cold water. Next stir into this solution 8½ parts of zinc dust little at a time. The whole which is stirred from time to time, is left to stand for 4 or 5 hours, and then mixed with 11½ parts of lime slaked in 30 parts of water. After allowing the sediment to settle, it is decanted and the sodium hyposulphite is precipitated by adding sodium chloride. Now by treating the unstable sodium hyposulphite with a little alcohol, the water of anhydrous salt which is fairly stable is obtained and is sold in the name of hydrosulphite of soda.

PARAFFIN WAX

635 T.S., Ellore—Desires to know the process of manufacturing paraffin wax.

This remarkable solid hydrocarbon is obtained from crude petroleum by distillation. In paraffinic crudes, there is obtained a fraction known as wax distillate. Separation of the wax and oil in the wax distillate should be done to render both usable. For this purpose the wax distillate by either of two methods, namely sweating process and solvent process.

SWEATING PROCESS

The first step in the separation of the wax distillate is termed pressing, and consists, essentially, of filtering solid wax from liquid oil at low temperatures. Dewaxed oil and slack wax are produced in this operation. Often the paraffin distillate is diluted with dewaxed oil to

facilitate handling. This is particularly necessary if the wax content is high, since otherwise, the chilled mass will have a thick consistency and will be difficult to pump from the chillers to the filter presses.

Frequently, the prepared distillate is given a mild acid treatment to lighten its colour and remove highly polymerized impurities. After the acid treatment, the distillate is washed with water, neutralized with soda, and washed again. Finally, it is chilled to between 13 and 15°F., to precipitate the higher-melting, waxy hydrocarbons. The temperature to which the distillate is chilled is dependent upon the pour point which is desired in the dewaxed oil. For a 20°F. pour point, the above temperature is necessary. For lower pour points, the pressing temperature must be lowered accordingly. The chilled distillate is pumped to a bank of filter presses in which the crystalline wax is filtered from the dewaxed oil. This produces slack wax containing about 35% oil. The dewaxed oil is finally resolved into various paraffin oils and other light lubricating stocks by distillation and conventional refining procedures.

The slack wax, which melts at about 107°F. must be subjected to further processing, the first stage of which may be a second mild acid treatment. The slack wax then is charged, in molten condition, to sweaters which are generally of pan design. A conventional sweater consists of a room or oven in which is housed a stack of ten to fifteen or more horizontal trays each equipped with a gravity drain. The slack wax is allowed to solidify over water, the surface of which has been adjusted to be on a level with a wire mesh in each tray. When the wax is completely solid (wax temperature of about 80°F), the water is withdrawn and the slack cake, 5 to 10 inches thick, remains suspended on the screen. The sweater is then warmed at a rate of about 2°F. per hour circulating warm water through banks of tubes embeded in the wax and along the walls of the oven. Heat causes beads of oil to form on the surface of the wax, thus giving the appearance of sweating, hence this term. The oil and lower melting wax are allowed to drain away as the temperature increases. Finally, a cake of high-melting waxes remains, and is melted and segregated. This is known as yellow crude scale wax and it averages 5% oil and 122 to 124°F., in melting point. The oil and low-melting waxes comprise foots oil which is used as cracking feed for the manufacture of gasoline.

The crude scale wax is given a further mild acid treatment, washed, neutralized, and again washed, and is then in condition to be resweated to refined wax. These subsequent resweatings are frequently highly complicated and generally involve the recycling of the lower-melting fractions (intermediates) to produce a series of three or four grades of refined wax. For example, waxes melting at 130 to 132°F., 126 to 130°F., may be produced. Some refiners will produce a higher-melting grade, and others one melting at as low as 118 to 120°F. These waxes contain only 0.4% or less of oil and are used for blending to intermediate-melting waxes. Finished waxes are finally prepared by blending to melting point and filtering through bone char, bauxite, or some other suitable medium to produce water-white products.

Many of the white crude scale waxes, sold to-day, are treated in a similar manner, but, due to their nature, the refining has been unable to make them meet refined wax specifications. In other words, despite resweating from yellow crude scale wax, they still contain 2% oil, have low tensile strengths, are not entirely colour-stable and must be sold as white crude scale wax. On the other hand, other refiners merely treat yellow crude scale wax to a lighter colour to produce the same materials. Such white crude scale waxes are inferior to those which have been resweated.

SOLVENT-PRESSING PROCESS

In this method of producing paraffin wax, the raw material is the same wax distillate as used in the sweating process. In general, it is pressed to slack wax by conventional procedures, although a solvent-pressed slack may be used, in some instances, the oil content of which will be appreciably lower than usual. The slack wax is dissolved in a suitable solvent, which may be petroleum naphtha or a mixture of other solvents such as benzol and methyl ethyl ketone. In one process, three parts of slack wax and two parts of solvent are chilled to 45°F., and filtered in a wax press, as before, to yield a crude scale wax containing only 3% oil. This crude scale wax is further processed by repeated solvent pressing or recrystallization to yield suitable base waxes. The quantity of solvent and the temperature employed are by no means fixed, but are dependent upon the yield and melting point of the desired wax. Recycling of intermediate fractions is practised also in this process, but is not so complicated as in sweating because of the greater degree of fractionation which is obtained. For the same reason, only two or three blending waxes are produced, these being drier, less ductile and in general more oil-free than sweated waxes.

CIGAR LIGHTER

717 H. A. S. M., Baghdad—Desires to know a process of making cigar lighter.

The flints are cylindrical in shape and contain a large proportion of cerium. Alloys of cerium with either 30 per cent. iron or 12 per cent. magnesium are made. Put cerium metal 88 parts with magnesium 12 parts or cerium 70 parts with iron 30 parts in a crucible and melt these by means of strong heat. Now pour these alloys to suitable moulds.

SEWING MACHINE OIL

Almond Oil	9	oz.
Rectified Benzoline	3	"
Lavender oil	1	"

Mix and filter.

HALWA

720 V., Gurukul Kangri—Wishes to have a good recipe of making halwa.

Coarse Suji	1	seer.
Ghee	¾	„
Sugar, white	1½	seers.
Dry dates	½	seer.
Almond paste	¼	„
Pistachio	¼	„
Khoa	¼	„
Saffron	⅛	tola.
Cardamom minor	⅛	„
Cassia leaves	12	pieces.
Water		p.s.

Melt the ghee in a pan over a fire and when ready singe the cassia leaves and saffron. Pour in the suji and stir constantly until it begins to char. Then add water to make thin paste. Stir until ebullition occurs. Mix in the sugar and incorporate the remaining ingredients in paste form. Stir with a spatula and remove when thick. Finally, add cardamom powder and a little camphor.

GOLD INK

To prepare gold ink take honey and gold leaf, equal parts and triturate until the gold is reduced to the finest possible state of division. Agitate the mixture with 30 parts of hot water and allow it to settle. Decant the water, and repeat the washing several times. Finally, dry the gold and mix it with a little weak gum water for use.

SYNTHETIC JASMINE

744 R.P., Jehanabad—Desires to know a good recipe of synthetic Jasmine oil, and also essence of pear, etc.

Benzyl Acetate

Benzyl acetate or oil of jasmine can be prepared with a mixture of 109 c.c. of benzyl alcohol (obtained by the action of potassium hydroxide on benzaldehyde and subsequent distillation). 60.5 c.c. of glacial acetic acid, and 10 c.c. of concentrated sulphuric acid placed in a distilling flask of sufficient capacity and heated to the boiling point. At about 210°C., a sweet smelling oil will distill over and collect in the receiving flask. This oil is a natural constituent of oil of jasmine, ylang-ylang, and other flower oils.

PEAR ESSENCE

Acetic ether	5	oz.
Amyl acetate	10	„
Glycerin	10	„
Alcohol	100	„

Mix.

GRIPE CURE

Spirit ammon Co.	3	dr.
Potash bicarbonate	1 oz. 3	dr.
Simple syrup	32	oz.
Aqua caraway concentrated	1	„
Aqua anise, concentrated	1	„
Aqua anethi, concentrated	2	„
Distilled water	4 pints 4	oz.

Dissolve all the ingredients in the distilled water one by one.

Dose: For an infant, half a tea-spoonful, two months old, one or two tea-spoonfuls. The dose may be gradually increased.

ROSE WATER

Rose water may be prepared by distilling rose flowers by means of steam. For this purpose collect the flowers early in the morning before sunrise and convey them in bags to the distillers. The apparatus for distilling is of the simplest description. It consists of a large copper or iron boiler, well tinned, capable of holding from 8 to 12 gallons with a large body, a rather narrow neck, and a mouth about 8 inches in diameter, on the top of which is fixed the head of the still. This is merely a dekchi with a hole in the bottom to receive the tube of water which is well luted with flour and water. This tube is composed of two pieces of bamboo fastened together at an acute angle and covered in their whole length with a coating of stirring, over which mud is luted to prevent the vapour from escaping. The lower end of the tube is carried down into a long-necked vessel or receiver, called a bhubka. This is kept in a handi of water, which as it gets hot is changed. The end of the tube in the bhubka is padded with cloth to keep in the vapour. The boiler is let into an earthen furnace, and after being charged with the roses and a sufficient quantity of water, distillation is slowly proceeded with. A boiler of the size described will hold about 10,000 roses, about 10 seers of water will be poured on those flowers, and 8 seers of rose water will be obtained. After distillation the rose water is placed in a glass carboy and exposed to the sun for several days to become ripe, after which the mouth is stopped with cotton over which a covering of moist clay is put to prevent the scent from escaping.

LANOLIN FACE CREAM

918 E.E.T., Bombay—Wants to have a formula of lanolin face cream.

Lanolin creams make an excellent skin emollient. They generally consist of hydrous lanolin to which has been added a fixed oil and some glycerine. They should be well perfumed:—

Lanolin, hydrous	800	parts.
Almond oil	100	"
Glycerine	80	"
Benzoic acid	2	"
Coumarin	5	"
Musk ketone	1	part.
Linalol	2	parts.
Terpineol	3	"
Bergamot oil—terpeneless	2	"
Cistus R—colourless	1	part.
Amber liquid, No. 1006—	4	parts.

Melt the lanolin on a water-bath and add the oils and glycerine. Stir until of uniform consistency, and when cool add the perfumes which had been previously mixed.

ROSIN AND TURPENTINE

925 T.S., Ellore—Desires to know the process of extraction of rosin and turpentine oil.

Turpentine oil is usually manufactured from oleo-resin a gummy substance obtained by tapping chir pine (Pinus longefolia) a species of plant found in large numbers in the Punjab and the United Provinces.

To extract the oil, melt the oleoresin by the help of steam. In order to enhance the process add a little turpentine oil obtained from previous operation. By this treatment the dirt, water and other suspended impurities will sink to the bottom of the vessel. Then transfer the clear oleo resin into a suitable tank, from which from time to time a measured quantity of the substance is passed into the distilling vessel, which is provided with a steam jacket and kept hot by steam under pressure to maintain any desired temperature. Inject the steam under pressure whereby the oil of turpentine together with water vapour is distilled over. Lead the vapour through an empty vessel and then into a condenser. The object of putting the empty vessel into the intermediate position is to catch any oleo-resin that may have come over during the process. The liquid turpentine and water which collect in the receiving vessel at the further end of the condenser are now separated from each other mechanically. The oil thus obtained contains much impurities which may be removed by redistilling the oil in a separate vessel and passing through lime water. The purified oil still contains traces of water which are at present removed by storing the oil for a time in bulk.

The residue left in the still on cooling sets to a hard, brittle mass and is known as rosin. This may be drawn off while the still is moderately hot and pour into wooden barrels.

SALTED AND SMOKED FISH

785 F.H.J., Coimbatore—Wishes to have processes of making salted and smoked fish.

Fish may be preserved by the following methods.

Salting Fish dry: Take a good stoneware vessel or an earthen jar for the purpose. The fish should be cleaned and cut in pieces, and only fresh fish should be used. The fish should be weighed first and one-tenth of the amount of well-rubbed salt sprinkled over it. A little turmeric and red pepper may be added to improve the flavour. The individual pieces should be packed in layers and salt sprinkled between each layer so as to completely cover them. By this treatment fish will keep very well. If available a little lemon juice and salt-petre may be added during the rubbing of salt as this acts as a preservative and improves the flavour of the product.

Preserving Brine: Fish can be suitably preserved in a strong brine solution. A saturated brine solution should be made with the addition of spices, sugar, lemon juice, and salt-petre. Barrels or earthen jars may be used for the purpose. The brine solution should be heated first and then poured hot on the fish.

Drying fish: Fish may be easily dried in the sun with or without salting. But it is often found that insects cause a great deal of damage to the dried fish but this can be avoided by sprinkling powdered red pepper over them whilst they are hung on lines for drying.

Before drying fish should be cleaned and cut in halves without detatching them at the tail end. It is better to let them remain overnight in strong brine before putting in the sun to dry.

Smoking process: Fish can be smoked whole or cut in halves as desired. After cleaning they should be soaked in brine overnight and then be taken out and hung on lines in the smoking box.

Fish may easily be smoked in a large packing box. The box should be put on the ground and a hole dug to burn any good smoking material, such as, sawdust, paddy-husk, or bark of trees. The time of smoking varies with the size of the fish. It ranges, however, from 12 to 24 hours, but in the case of meat it takes longer. Experience will show how long to smoke fish so as to get the best colour, texture and flavour.

After the smoking is complete, the fish should be dried in the sun for 2-3 days. They should then be wrapped individually in parchment or wax paper and put in a box for storing and marketing.

—BRIEF QUERIES AND REPLIES

Questions of any kind within the scope of Industry are invited. Enquiries or replies from our experts will be published free of charge in serial order. Questions are replied by post on receipt of As. 8 stamps for each question. Subscribers outside India are requested to send two International Reply coupons for each question. In order to facilitate the work of Editor's Department and to help prompt action the readers are requested to send enquiries in separate letters.

1092 P. D. Malabar—We have no book on Coffee and Orange plantation. You may enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta.

1093 S. K. S., Bareilly—Address of Persian Oil Co. is not known.

1094 C. J. P. O. M., Bharthana—Process of manufacturing Caustic Soda from reh will appear in Formula section in due course.

1095 V. L., Lungleh—Process of cloth printing will be found in Cotton Dyeing & Printing published from this office, price Rs. 3-7 including postage. Tea flavour may be had of Paradise Perfumery House, 7, Colootola Street, Calcutta. Cigarette making on home industry basis is not possible as small machines are not available. Process of cigarette making will be found in Indian Tobacco and Its Preparations published from this office, price Rs. 3-7 including postage.

1096 H.K.D., Jorhat—Cigarette making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta. Cigarette making process will be found in Indian Tobacco and Its Preparations published from this office.

1097 B.B.S., Chaibasa—For ice candy making machine enquire of the following firm: Refrigerators (India), Ltd., 59-C, Park Street; Refrigeration & Air Conditioning Industries Ltd., 34, Ezra Street and M. S. Vernal & Co., Bharat Insurance Bldg., Chittaranjan Avenue, South; all of Calcutta.

1098 R C.S, Lohiabead—Laundry machines may be had of Jessop & Co., Ltd., 93, Netaji Subhas Road, Calcutta. We have no book dealing on laundry machine.

1099 S.S., Damah—We are not aware of any business which can be started with Rs. 500 to Rs. 1000 and will yield Rs. 4 to Rs. 20 as profit per day.

1100 I.M.M., Gwalior—Wants to be put in touch with the stockist of gas masks in India.

1101 P.H., Mhow—Process of enamelling photos will be found in Independent Careers for the Young published from this office, price Rs. 3/7/- including postage.

1102 D.P.S., Eluru—Vide No. 1063 in last issue of Industry.

1103 N.C.J., Aligarh—Following is a formula of rubber stamping ink: Methyl violet 1 part; Hot water 10 parts; Gum arabic 1 part; Glycerine 25 parts; Denatured alcohol 8 parts. Make a solution of the first three ingredients, add glycerine and alcohol. Filter before packing. It is not possible to remove the stain of this ink from paper without damaging the paper.

1104 T.G.M., Nandyal—Process of iridium *pointing fountain* pen nibs will appear in Formula Section in due course.

1105 S.S.M., Ajmer—Formulas you require will appear in Formula Section in due course.

1120 L.L.G.C., Kuppam—For raw materials required for printing ink enquire of B. K. Dutt & Co., 35, Netaji Subhas Road; B. K. Sen, 39, Netaji Subhas Road and Bengal Paint Supply Co., 16, Bonfield Lane; all of Calcutta. Chemicals may be had of Allied Agency, 16, Bonfield Lane and Calcutta Chemical Co., Ltd., 10, Bonfield Lane; both of Calcutta.

1121 H.S., Amingang—You may consult Electrician published from this office.

1122 A.D.D., Secunderabad—Wants to be put in touch with the manufacturers or suppliers of wooden frames for rubber baloon, sulphur chloride and rubber latex 60 p.c.

1123 U.C.C., Srinagar—For stationery goods and paper enquire of Alliance & Co. (India) Ltd., Bari Market, Sadar Bazar, Delhi; Bharat Stationery Mart, Chowk Hauz Kazi, Delhi; Bombay Stationery Mart, 19, Sir P. Mehta Road, Bombay; Central Stationery Mart, 2, Bruce Street, Fort, Bombay; East India Stationery Mart, 30A, Cowasji Patel Street, Bombay; Calcutta Stationery Emporium, 131, Radha Bazar Street, Calcutta; City Stationery Mart, 14-2, Old China Bazar Street, Calcutta and Ghosh & Co., 14/2, Old China Bazar Street, Calcutta.

1124 M.S.B.S.; Bombay—Wants to be put in touch with the manufacturers of elephant bells of all sizes.

1125 D.N.A.C., Rangoon—You may add 2 tolas of compound scent for every 100 tolas of oil.

1126 A.H.S., Trichur—Reply to your query appears in July 1950 issue of Industry.

1127 B.M.R., Rohini—We are not aware of any such institute in India.

1128 A.D., Akalkot—Process of manufacturing fire works will be found in Home Industries published from this office, price Rs. 3/7/- including postage. You may also consult The Art of Pyrotechnic by Kentish.

1129 A.H., Baipeta Road—For dyes enquire of Fuzlehussein & Bros., 44, Armenian Street and Champalal Agarwala, 45, Armenian Street; both of Calcutta. For cloth printing blocks you should communicate with local carpenters who may help you in preparing the blocks.

1130 N.S.P., Chalakudi—Cigarette making machines may be had of Small Machineries Manufacturing Co, 22, R. G. Kar Road, Calcutta.

1131 T.K.S.C. Salem—Wants to be put in touch with the suppliers of art paper bags. For selling margosa oil and cake you should advertise in newspapers.

1132 V.L.R.I., Trichur—Oils obtained from mines are known as mineral oil. You may use white oil. Accelerator and antioxidant may be had of Najmuddin Bros., Akber Chambers, Mohamedali Road, Bombay 3.

1133 G.S., Saharanpur—You may consult Plastic Industry published from this office.

1141 B.C.W., Patiala—Take one maund of sesame oil and put into it 5 srs. unseeded and pulverised amla for 24 hours, heat the oil over water bath or slow fire for 2 hours. Then cool and strain through a cloth Now add the following compound scent 1 lb. for one maund of oil. Bergamot oil 1 oz.; Lavender oil ½ oz., Lemon oil ½ oz.; Clove oil ½ oz ; Cassia oil ½ oz. put this compound in a stoppered bottle at least for 15 days. Then use.

1142 G.S.S., Patna—Particulars of improved type of plough are not available.

1143 A.A.G., Drapha—In order to refine groundnut oil treat the oil with 10 per cent of its weight fuller's earth, which should be dehydrated by roasting prior to use. Mix thoroughly and then heat the mixture to 100°F. and maintain the temperature constant for about 15 minutes. Lastly filter the oil through filter press. Thus a clear oil is obtained but the odour of the oil is somewhat earthy. To remove this bad odour wash the oil with 1 per cent. solution of brine consisting of an equal amount of dry sodium bicarbonate. A formula of medicated oil appeared in April 1950 issue of Industry.

1144 G.D.S., Meerut—For the machine required enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. We have no book in Hindi.

1145 M.K.M.S.M., Kulasekharapatnam—For selling the articles you deal in advertise in Industry.

1146 U.K.D., Bombay—Process of manufacturing paper pulp from bamboo and other grass will appear in Formula Section in due course.

1147 G.K.T.C., Darbhanga—For cement enquire of the following firms: Bharat Trading Co. Ltd., 29, Banstolla Street; Jugal Kishore Dhandhania, 203, Chittaranjan Avenue; S. K. Bhattacherjee & Co., 32E, Jackson Lane and S. K. Mazumdar, 6, Mangoe Lane; all of Calcutta. Soda ash may be had of Imperial Chemical Industries (India) Ltd., 18, Strand Road, Calcutta. For cycles enquire of Bimal Bros.. 1B, Chowringhee and Bentinck Cycle Co. Ltd., 1-2 Chowringhee Road; both of Calcutta.

1154 C.S.S., Ajmer—Formulas of artificial marble, luminous paint, golden ink, transparent soap, etc., will appear in Formula Section in due course. For embossing machine enquire of Azad & Co., Aligarh.

1155 M.B.B., Muzaffarpur—An article on phenyle manufacture appeared in April 1950 issue of Industry.

1156 A.M.E., Winneba—For particulars you should write direct to the advertisers.

1158 H.R.S., Hubli—You may consult Manufacture of Rubber Goods published from this office, price Rs. 3/7/- including postage. Rubber chemicals may be had of Najmuddin Brothers, Akber Chambers, Mahomedabad Road, Bombay.

1157 B.R.T., Ratannagar—We have not received the sample of stone sent by you.

1159 J.G.M., Ahmedabad—For strawboard making machines enquire of Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta.

1160 P.G.P., Kandy—You should consult an expert who will help you by supplying estimates of biscuits, chocolate and other confectioneries. Advertise in newspapers for securing services of an expert.

1161 J.R.S., Ludhiana—Process of galvanising will be found in Electroplating in Practice published from this office, price Rs. 3/7/- including postage.

1162 R.G.S., Sira—Reply to your letter has been sent by post.

1164 C.A.A.W.C., Cochin—Hosiery knitting machines may be had of W. H. Brady & Co. Ltd., Mercantile Bldg., Lall Bazar, Calcutta.

1165 S.M., Madras—For automatic telephone exchange enquire of Chicago Telephone and Radio Co. Ltd., 127, Mahatma Gandhi Road, Fort, Bombay.

1166 N.N.L., Talod—Process of making distilled water appeared in November 1949 issue of Industry. Distilling apparatus may be had of Adair Dutt & Co. Ltd., Stephen House, 4, Dalhousie Square, Calcutta.

1167 R.S., Dalmianagar—You have to use bone crushing machine which may be had of Marshall Sons & Co. Ltd., 99, Netaji Subhas Road, Calcutta. Process will be found in Manures and Their Application published from this office, price Rs. 2/7/- including postage.

1168 M.S.E.S.A., Calcutta—We have no book on glass manufacture. For coal enquire of the following firms: Bengal Coal Co. Ltd., 8, Clive Row; Diamond Coal Co., 11, Netaji Subhas Road, and India Coal Supply Syndicate, 100, Netaji Subhas Road; all of Calcutta.

1169 P.B.I.L., Mathurai—You may also take up manufacture of cake and bread along with biscuits. In this way you may expand your business. Process of manufacturing biscuit cake and bread will be found in Home Industries published from this office, price Rs. 3/7/- including postage.

1189 E.I., Jullundur—Process of manufacturing boot polish will be found in Prospective Industries published from this office, price Rs. 3/7/- including postage. Following is a formula of heel ball: Carnauba wax 1 part; Hard paraffin 60 parts; I. G. wax 15 parts; Beeswax 18 parts. Melt over slow fire and cast in suitable moulds.

1190 J.N.M.C., Calcutta—You may consult Plastic Industry published from this office.

1191 H.P.J., Rambukkana—82 lbs make one md. For vetiver oil enquire of F. N. Sarkar, 37, Canning Street, Calcutta and Ghose Bros., 50, Ezra Street, Calcutta.

1192 C.J.B., Nowgong—We have no book on glass manufacture. Raw materials for glass industry may be had of Calcutta Mineral Supply Co., 31, Jackson Lane, Calcutta. For books on glass manufacture enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East and W Newman & Co Ltd. 3 & 4, Old Court House Street, both of Calcutta.

1193 C.L.S. Batala—Process of manufacturing pencil will be found in Industry Prize Article.

1194 M.D.C., Junagadh—Following is a formula of tincture of catechu: Catechu 2 lbs.; Oil of cassia 3 fl. dr.; Rectified spirit and water, each 1 gall. Macerate for 10 days. Dose: 1 to 2 fl. dr. as a warm astringent in diarrhoea; either alone or combined with chalk.

1195 B.M., Ludhiana—Rectified spirit 69.3 p.c. contains more water than 90 p.c. alcohol so you have to use more rectified spirit in manufacturing transparent soap.

1196 E.P.L., Whitefield—Process of manufacturing ink and soap will be found in April 1950 issue of Industry.

1197 R.C.N.C., New Delhi—For registering your firm you may negotiate with the following firms: A. Mitra & Co., 5-2F, Raja Rajballav Street; Dutt & Co., 82, Harrison Road and Law Morris & Co., 19, Strand Road; all of Calcutta.

1198 F.S., Penang—In manufacturing fountain pen ink take 3 gallons distilled water instead of 3½ gallons.

1199 E.R.S., Shimoga—Following is a formula of agarbatty: Musk 10 grains; Ambergris 10 grains; Powdered benzoin 1 oz.; Powdered camphor 1 oz.; Powdered cascarilla 1 dr.; Powdered nitre 1 dr.; Powdered charcoal 2 oz. Mix and make in a thin paste with mucilage of tragacanth, then sticks are made by dipping thin wooden splinters into the emulsion.

1200 J.C., Adoni—Process of manufacturing liquid phenyle appeared in April, 1950 issue of Industry.

1201 M.R.P., Ernakulam—Following is a formula of essence of capsicum: Capsicum 3 lbs.; Rectified spirit 1 gall.; Digest 14 days, press and filter. You may consult Manufacture of Syrup and Cold Drinks published from this office, price Rs. 3/7/- including postage.

1208 M.I., Indore—Candle and chalk stick making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

1209 B.K.B., Bombay—Process of manufacturing phenol formaldehyde powder, urea formaldehyde powder and bakelite powder will be found in Plastic Industry published from this office.

1211 V.M., Raipur—Address of Indian Rubber Board is 7, Homji Street, Fort, Bombay.

1212 N.J.V.C., Murtizapur—Cane may be had of B. C. Nandy & Co., 71K, Netaji Subhas Road and Singapur Cane Manufacturing Co., 137, Canning Street; both of Calcutta. For toys enquire of Mir Gulam Ali, Mysore House, No. 4, New Market, Bangalore City and Mysore Agency, Mysore. Following is a list of bucket manufacturers: Bengal Bucket & Steel Works, 49, Netaji Subhas Road; Binapani Galvanising Works, 137-1-2, Ultadanga Main Road; Bucket Manufacturing Co. of India, 24, Strand Road and Dhar Galvanising Works, 92, Ultadanga Main Road; all of Calcutta. Formulas of chocolate, toffee, will appear in Formula Section in due course.

1213 S.K.A., Imphal—Match making machines may be had of Standard Machinery Co., 86B, Netaji Subhas Road and Harima Engineering Works, 69/1, Belgachia Road; both of Calcutta.

1214 K.N.K., Ghaziabad—Acetic acid is used in manufacturing vinegar. Castor oil is used as hair oil, as laxative and in making lubricating oil. Ethyl acetate and amyl acetate are used in making thinners. Casein is used in manufacturing waterproof glue. You may start washing soap factory with Rs. 5,000/- as initial capital.

1215 S.K.V., Lucknow—For weighing machine write to Avery Co. Ltd., Waterloo Street, Calcutta.

1216 T.P.K., Asansol—The book you require may be had of W. Newman & Co. Ltd., 3 & 4, Old Court House Street and Thacker Spink & Co. (1933) Ltd., 3, Esplanade East; both of Calcutta.

1217 P.B.R., Jullundur Cantt—For grinding machine you may enquire of Marshall Sons & Co. Ltd., 99, Netaji Subhas Road and Francis Klein & Co. Ltd., 1, Royal Exchange Place; both of Calcutta.

1218 V.M.P.W., Trichur—For printing machine write to John Dickinson & Co., 6, Clive Row, Calcutta.

1219 I.A.K., Dhrapha—Process of making aqua caraway, dill water, etc. will appear in Formula Section in due course.

1220 S.D.K., Bombay—Following is a formula of slate pencil: Powdered slate 60 parts; Powdered limestone 30 parts; Sodium silicate 10 parts. Knead together all the ingredients to form a plastic mass and then force it through metallic tubes of suitable diameter filled with pistons. Afterwards cut off into small lengths and bake over a slow fire.

1221 R.N.A., Kot Kapura—For plastic machine you may enquire of Francis Klein & Co. Ltd., 1, Royal Exchange Place; Small Machineries Mfg. Co., 22, R. G. Kar Road; Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension and Vulcan Machine & Tool Co., 66, Manicktala Main Road; all of Calcutta.

1222 U.P., Kamargaon—Bullock driven rice huller is not available.

1223 S.B.P., Berhampur—For manufacturing hurricane lanterns sheet metal working machine is required which may be had of Alfred Herbert (India) Ltd., 13/3, Strand Road, Calcutta.

1224 M.T.C., Moshi—Sugar candy is prepared from the saturated solution of sugar, formed by adding sugar to boiling water till it dissolves no more. The solution is then run into troughs, in which it is allowed to cool slowly, while a number of threads are hung in the liquid upon which the crystals form, and continue to grow. The time required will depend on the bulk of sugar treated. In working on a small scale it will be necessary to remove the strings and adhering crystals; then add more sugar to the liquid, boil up, and immerse the strings again while the liquid is cooling. Cakes of candy will also separate on the sides of the vessel in which the liquid cools.

1225 R.P.M., Amritsar—Process of manufacturing peppermint oil and basuti will appear in Formula Section in due course.

1227 B., Calcutta—A formula of tooth powder appeared in March 1950 issue of Industry. A good recipe of mouth wash appeared in November 1949 issue of Industry.

1228 P.C.B., Asansol—For bakery machine enquire of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

1229 K.N.S., Calcutta—You may try the following formula for fixing label on tins: Wheat flour 4 oz.; Nitric acid 1 dr.; Boric acid 10 gr.; Oil of cloves 5 drops; Carbolic acid ½ dr. Stir flour and water together mixing thoroughly, and add the other ingredients. After the stuff is well mixed heat it, watching very carefully and removing the instant it stiffens.

1230 R.M.A., Silchar—Wire nail making machines may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. For rice mill machinery write to Marshall Sons Co. Ltd., 99, Netaji Subhas Road and Francis Klein & Co. Ltd., 1, Royal Exchange Place; both of Calcutta. The above firms will supply you with estimates.

1231 O.S., Dharampuri—For plastic article enquire of Plasto-Metal Moulding Co. of India, Lalgir Mansion, Harvery Road, Bombay and Popular Plastics, Ruby House, Opp. Colaba Tram Terminus, Bombay 5.

1232 R.L.S., Sikar—Button making machines may be had of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta.

1233 S.V., Lucknow—Following is a formula of liquid gum: Gum acacia 100 parts; Water 140 parts; dissolve and add glycerine 10 parts; Acetic acid (33 per cent) 20 parts; Aluminium sulphate 1 part. Set aside for a few days.

1234 M.I., Chapra—A formula of blue black fountain pen ink appeared in April 1950 issue of Industry.

1235 H.K., New Jotol—Suji is made from wheat in making atta. After making atta it is sieved when the bigger grains remain in the sieve which are known as suji. Hulwa is made from suji.

1236 A.G.C., Trivandrum—It is not possible to transfer printed coloured picture.

1237 R.C.L., Ludhiana—For machineries required enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension; Francis Klein & Co. Ltd., 1, Royal Exchange Place; both of Calcutta. As regards foreign addresses you may negotiate with Wilcox & Co Ltd., Barr Street, Birmingham, England and A. E. Wara & Co. Ltd., No. 15, Archway, Livery Street, Birmingham, England.

1238 O.P., Jullundur City—For asphalt enquire of Bitumen Emulsions (India) Ltd., 7/1, Hide Road, Kidderpore, Calcutta and Universal Asphalt Products & Construction Co., "Lacitadelle", Queen's Road, Bombay.

1239 B.N.K., Birlapur—For silvering mirror you may try the formula that appeared in April 1950 issue of Industry.

1243 H.S.M.C., Gulbarga—For the book required enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East and W. Newman & Co. Ltd., 3 & 4, Old Court House Street; both of Calcutta.

1244 F.F., Punalur—You may consult All About Fruits published from this office. For a list of books on canning write to Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta.

1245 B.M.B.M.S., Kathmandu—You may negotiate with P. C. Bhattacherjee, B.A., 16/1, Nandalal Bose Lane, Calcutta 3 for expert advice on perfumes, hair oils and toilet preparation.

1246 C.C.C., Jullundur—Process of manufacturing essence of coconut will appear in Formula Section in due course.

1247 T.W.W., Silchar—Formula of ink powder and fluid ink appeared in April 1950 issue of Industry. A formula of slate pencil appears under No. 1220.

1248 S.D., Vadakangulam—For preserving fruit juice you should use sodium metabisulphite. Proportion should be 1/1000 part in 1 part juice.

1249 A.N., Kuhuri—You may consult The Art of Pyrotechny by Kentish.

1250 M.M.S., Delhi—You may use white oil which is deodorised mineral oil For white oil enquire of Western India Oil Distributing Co Ltd., Alice Bldg., Hornby Road, Fort, Bombay.

1251 S.V., Lucknow—Gamboge dragon's blood, etc., may be had of Banshidhar Dutt, 126, Khengrapatty Street, Calcutta. Creosote oil, oxalic acid, etc., may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane, Calcutta. Process of manufacturing cork sheet out of waste cork dust and powder will appear in Formula Section in due course.

1252 C C., Trivandrum—It is not possible to colour charcoal.

1153 C I., Delhi—Your enquiry letter has already been replied by post.

1254 P.G.M., Karimganj—Following is a list of hardware merchants: Banamali Dey, 113, Manohar Das Chowk; Bengal Hardware Store, 165,-66, Chandney Chowk, Bombay Hardware Mart, 82, Netaji Subhas Road; Buher & Co., 12, Netaji Subhas Road; Calcutta Hardware & Metal Supply Co., 9, Clive Row; D. P. Ghose & Co., 113, Manohar Das Chowk and Dey Bose & Co., 34, Strand Road; all of Calcutta.

1255 V.A.C.W., Dindigul—Process of manufacturing candle appeared in April 1950 issue of Industry.

1256 M.L., Jullundur City—Plastic machine and mould may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta; Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta and Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta.

1257 R.C.G., Ludhiana—Process of colouring steel will appear in Formula Section in due course.

1258 B.K.S., Monghyr—For machines you may enquire of the following firms: Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road; Marshall Sons & Co. Ltd., 99, Netaji Subhas Road; Francis Klein & Co. Ltd., 1, Royal Exchange Place; T. E. Thomson & Co. Ltd., 9, Esplanade East and Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension; all of Calcutta.

1259 R.R.M., Bombay—Formulas you require will appear in Formula Section in due course.

1260 F.P.L F. Muzaffarnagar—Chemical Industries of India does not contain particulars regarding carbon dioxide gas plant.

1261 L.N D., Chatrapur—For power loom enquire of W. H. Brady & Co. Ltd., Mercantile Bldg., Lall Bazar, Calcutta.

1262 U.K D., Bombay—Process of manufacturing paper pulp from bamboo and grass will appear in Formula Section in due course.

1299 K N., Selu—For books write to R. R. Bowker Co., 62, West 45th. Street, New York 19; The Macmillan Co., 60, Fifth Avenue, New York 3; Continental Publishers & Distributors Ltd., 225, Blackfriar Road, London S. E. 1 and Southeran Henry Ltd. 2, 3, 4 & 5, Sackville Street, Piccadilly, London W1. You may negotiate with the Supdt., Maharashtra Niwas, 85/1/1, Beltola Road, Bhowanipore, Calcutta.

1326 E.P.S W., Batala—Process of bending wood will appear in Formula Section in due course.

1327 L.B.B., Aijal—For marble cloth and paper of different colours enquire of Modern Stationery Agency, 142, Old China Bazar Street, Calcutta, Favourite Book Cloth Mart, 12, Mirza Street, Bombay and Calcutta Stationery Supply Co., 47, Baitakkhana Road, Calcutta.

1328 A.A.W.C, Vaniyambadi—Process of refining jaggery will appear in Formula Section in due course.

1329 A.N., Hapur—Process of manufacturing blue-black ink appeared in April 1950 issue of Industry.

1330 J.N., Puri—You may consult Plastic Industry and Chemical Industries of India both the books published from this office.

1331 K.R., Bellary—Plastic machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road; Vulcan Machine & Tool Co., 66, Manicktala Main Road and Francis Klein & Co. Ltd., 1, Royal Exchange Place; all of Calcutta.

1332 K.B.S.B.C., Imphal—For manufacturing salt sea water is required.

1333 A.V.H., Saidapet—Present address of Tushar Kanti Ghosh & Co. is not known.

1334 P.C., Delhi —You may consult Prospective Industries published from this office.

1335 J.P.S.L., Kanpur—Process of manufacturing phenyle, face cream, etc., will be found in April 1950 issue of Industry. Process of manufacturing tooth powder and paste will be found in Dental Preparations published from this office.

1336 H.P., Muzaffarpur—For glass phials enquire of the following firms: Imperial Glass Works, 9, Ezra Street; S. N. Paul & Bros., 186, Old China Bazar Street and Satcouri Dass & Co., 196, Old China Bazar Street; all of Calcutta. Collapsible tubes may be had of Metal Box Co. of India Ltd., B2, Hide Road, Kidderpur, Calcutta.

1337 K.I.A., Cochin—Yes, you may start ink, battery and mantle manufacture. These industries have good prospect. We have no book on mantle manufacture. You may consult Manufacture of Ink and Manufacture of Batteries—both the books published from this office, price Rs. 3/7/- each including postage.

1338 P.A.J., Cochin—For mushroom cultivation try dilute acetic acid.

1339 J.V, Bellary—For needle making machine enquire of Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta.

1340 D.R., Ludhiana—We have no Hindi book.

1341 P.R.S., Kanpur—Following is a list of fishing tackle dealers: Bengal Import & Export Corpn. Ltd., 12-1, Beliaghata Main Road; Das Gupta Bros. & Co., 193B, Cornwallis Street; Kanto Bros., 158, Bowbazar Street and Paul & Co., 156, Bowbazar Street; all of Calcutta.

1342 G.K.P., Barsi—For knitting machine write to W. H. Brady & Co. Ltd., Mercantile Bldg., Lall Bazar, Calcutta. Following is a list of calcium carbide dealers K. C. Dey & Sons, 161/1, Harrison Road; Radha Kanto Dass & Sons Ltd., 21, Old China Bazar Street and Shaw Wallace & Co., 4, Bankshall Street; all of Calcutta.

1344 J.H.W.E.W., Nagpur—Address of Bengal Millowners' Association is 2, Church Lane, Calcutta. Address of Madhya Bharat Millowners' Association is Indore. Address of Madras Cloth Dealers' Association is 41, Purasawalkam High Road, Madras.

1345 S.S.D., Delhi—There is no arrangement for giving practical training on milk product manufacture.

1346 C.B.J., Cocanada—Pill making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta and Dr. Bose's Laboratories Ltd., 45, Amherst Street, Calcutta. We have no book on pill making.

1347 M.N.K., Bharatpur—Refer your query to the Commerce Ministry, New Delhi.

1348 G.S.S., Nagina—For stampings you may write to Francis Klein & Co. Ltd., 1, Royal Exchange Place, Calcutta.

1349 R.B.B., Gondia—Following is a list of nut dealers: Banshidhar Dutt, 126, Khengrapatty Street, Calcutta; Amarnath Kundu & Bros., 14-3, Old China Bazar Street, Calcutta and Dawn & Co., 11, Portuguese Church Street, Calcutta.

1350 B.T., Shillong—Process of preparing liquor will appear in Formula section in due course.

1351 G.B.T.E., Benaras—We are not aware of any such book. But you may consult Manufacture of Ink published from this office, price Rs. 3/7/- including postage.

1352 S.S.L.S., Lucknow—For soap write to Banga Luxmi Soap Works Ltd., 11, Clive Row; Bengal Chemical & Pharmaceutical Works, Ltd., 164, Manicktala Main Road; Calcutta Chemical Co. Ltd., 35-1, Panditia Road, Ballygunge; Calcutta Soap Works, Calso Park, Tiljala; Golden Soap Factory Ltd., 171A, Harrison Road; Jadavpur Soap Works, 5/2, Garstin Place; Nasco Ltd., 11, Netaji Subhas Road; Lever Bros. (India) Ltd., 9, Lyons Range; Standard Soap Works, 10-1, Bipradas Street; Sisir Soap Factory, 12-1, Jessore Road and Prosonna Soap Factory, 105/1, Ultadanga Main Road; all of Calcutta.

1353 K.A., Anakapalli—Following is a list of tanneries: Ah-Waar Tannery, 37, South Tangra Road, Calcutta; Chautai Tannery, 47, South Tangra Road, Calcutta; Modern European Tannery Ltd., 102, Tapsia Road, Calcutta; National Tannery Co. Ltd., Mercantile Bldg., Lall Bazar, Calcutta; North West Tannery Co., Civil Lines, Kanpur; Chrome Leather Co. Ltd., Chromepet, Madras; Tinnevelly Tanneries Ltd., Station Road, Sermadevi and Bangalore Chrome Tanning Co., Jeevanhally, Bangalore.

1354 D.S., Kalyan Camp—Process of rubber stamp making will be found in Manufacture of

Rubber Goods published from this office. Process of block making will be found in Independent Careers for the Young.

1355 B.C.G., Cuttack—Process of curing leather and fur will appear in formula section in due course.

1356 J.P., Nidadavole—For sulphuric acid plant you may write to R. J. Alcock & Co., P-12, Mission Row Extension: Francis Klein & Co. Ltd., 1, Royal Exchange Place and Kusum Engineering Co. Ltd., 25, Swallow Lane: all of Calcutta.

1357 J.A.S., Tenali—We have no such book. You may however enquire of Thacker Spink & Co. (1933) Ltd., 3, Esplanade East; W. Newman & Co. Ltd., 3, Old Court House Street; both of Calcutta for the book required.

1358 M.D., Junagadh—Process of manufacturing dyes from catechu and tannic acid from tannin will appear in formula section in due course.

1359 S.C.B., Berhampore—Following is a list of automobile institutes: Automobile Engineering Institute, 33, Rowland Road, Calcutta and French Motor Car Co. Ltd., 243-3, Lower Circular Road, Calcutta.

1360 M.S., Ludhiana—For Hind Cycle you may write to Hind Cycle Ltd., Kilachand Devchand Bldg., 45-57, Apollo Street, Fort, Bombay. For other make cycles enquire of Bentinck cycle Co. Ltd., 1-2, Chowringhee Road; Bimal Bros., 1-B, Chowringhee and British & Continental Agency, 40, Strand Road: all of Calcutta.

1361 V.N.S., Shencotta—Yellow beet root sliced dried in a kiln or oven and ground with a little coffee is used as coffee substitute.

1362 A.C.D., Silchar—Following is a list of Tea Estates: Ambari Tea Estate Factory, Carrar, Jalpaiguri; Banarhat Tea Estate Factory, Banarhat, Jalpaiguri and Baradighi Tea Estate Factory, Baradighi, Jalpaiguri. You may correspond with the above firms offering your service.

1363 P.B.W., Allahabad—Electroplating materials may be had of Alfred Herbert (India) Ltd., 13/3, Strand Road, Calcutta.

1364 A.E.I., Calcutta—Following is a list of pencil manufacturers: F. N. Gooptu & Co., 12, Belliaghata Road, Calcutta; G. C. Law & Co., 2, Cornwallis Street, Calcutta; Madras Pencil Factory, 5, Stringer Street, G. T., Madras; Quilon Pencil Factory, Quilon and Victory Pencil Co., Beach Road, Quilon.

1365 N.R.B., Calcutta—For herbs write eo Banshidhar Dutt, 126, Khengrapatty Street, Calcutta; P. C. Dawn & Co., 1, Mechua Bazar Street, Calcutta; Banga Lakhmi Bhandar, 12, Cotton Street, Calcutta and Bengal Herb Stores, 2, Mullick Street, Calcutta.

1366 R.B., Gondia—Can supply marking nuts in large quantity.

1367 T.T.T., Dacca—A list of tea merchants and tea planters will be found in Industry Year Book & Directory published from this office.

1368 D.D., Cochin—We have no book on canning. You should consult an expert for fruit and fish canning.

1369 J.P.D., Agra—Process of manufacturing phenyle appeared in April, 1950 issue of Industry.

1370 V.G.P., Bombay—Following is a formula of chalk stick: Plaster of Paris 1 part; Precipitated chalk 1 part; Water sufficient to make soft mass. Mix the plaster with the chalk and add sufficient water to make mass. Then pour into gun metal moulds well oiled. Allow the mass to set and then take out.

1371 D.A.F.S., Colombo—Beeswax may be had of Banshidhar Dutt, 126, Khengrapatty Street, Calcutta and P. C. Dawn & Co., 1, Mechua Bazar Street, Calcutta.

1372 I.P.H., Hassan—Process of manufacturing fountain pens will be found in Mechanical Industries published from this office, price Rs. 3/7/- including postage. Process of manufacturing plastic letter is not available.

1390 N.B.S.R., Ballabgarh—Following is a list of bone mills: Alladin Bone Mills, Secunderabad, Deccan; Ballykhal Bone Mills, 9, Theatre Road, Calcutta; Bellary Oblapuram Bone Mill Factory, Cowl Bazar, Bellary; Chingrihatta Bone Mill, 6, Ram Mohan Mullick's Garden Lane, Calcutta and Ganges Valley Bone Mills, Uttarpara.

1392 H.D.C., Thoubal—For Canada balsam write to Banshidhar Dutt, 126, Khengrapatty Street, Barrabazar, Calcutta. Process of tempering iron will appear in formula section in due course.

1393 B.G.R., Calcutta—For book binding machines enquire of John Dickinson & Co., 6, Clive Row, Calcutta and Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, all of Calcutta.

1394 S.W.J., Massachusetts—Following is a list of novelty dealers: Calcutta Fancy Stores, 209, Bow Bazar Street, Calcutta; S. W. Hari Prasad, B-21, 24, New Market, Calcutta and Narayan M. Panday, 52, Sutar Chawl, Bombay.

1395 D.C.H.C., Lashkar—For jute bags enquire of the following firms: A. J. Shellim & Co., 15, Netaji Subhas Road; Adamjee Hajee Dawood & Co Ltd, 5, Dalhousie Square; B. M. Kharwar, 161-1, Harrison Road; B. N. Elias & Co. Ltd., Norton Bldgs., 1 & 2, Old Court House Corner and Kedarnath Mohanlal, 130, Mechua Bazar Street; all of Calcutta. Washing soda may be had of Imperial Chemical Co. of India Ltd., 18, Strand Road, Calcutta Addresses of soap manufacturers will be seen under 1352 above.

1396 I T., Morena—Following is a list of fountain pen manufacturers: The Long Pen Co. Ltd, Hope Street, Liverpool; Waterman's Pens L. G. Sloan Ltd., The Pen Corner, 41, Kingsway, London, W. C. 2, Wyvern Fountain Pen Co Ltd., Belgrave Street, London W. C. 1 and Unique Pen Co Ltd, Kingston Road, Raynes Park, London S. W. 20.

1397 K.C A., Kanpur—We have no book dealing with tack manufacture You may write to Thacker Spink & Co (1933) Ltd., 3, Esplanade East, Calcutta for the book required.

1398 S D, Calcutta—Process of manufacturing tin chloride will appear in formula section in due course.

1399 B K M., Serampore—Process of manufacturing aluminium and lead alloy will appear in formula section in due course.

1400 S M S, Chapra—We cannot understand what you mean by glass starch which is a proprietory article.

1401 C.R N. Vizagapatam—Following is a formula of hydraulic brake fluid: Triethelene glycol 90 parts, sulphonated castor oil 10 parts. Mix.

1402 T.N S., Mhow—All the chemicals and raw materials may be had of Banshidhar Dutt, 126, Khengrapatty Street; Calcutta Chemical Co. Ltd, 10, Bonfield Lane. B K. Paul & Co. Ltd., 1 & 3, Bonfield Lane; Rajaram & Co, 37, Grants Street, Essences & Bottle Supply Agency, 14, Radha Bazar Street and Paradise Perfumery House, 7, Colootola Street, all of Calcutta. Cardboard boxes may be had of Bengal Cardboard Industries and Printers Ltd., 165, Cornwallis Street, and S. Antool & Co. Ltd., 91, Upper Circular Road; both of Calcutta. Tin boxes may be supplied by Bengal Tin Box Mfg. Co. Ltd., 1, Jadu Nath Mitter Lane, Shambazar, Calcutta; and National Sheet & Metal Works Ltd., 36A, Sahitya Parishal Street, Calcutta For small machineries write to Small Machineries Mfg. Co, 22, R. G. Kar Road; Oriental Machinery Supplying Agency Ltd P12, Mission Row Extension; and International Trading Co., 13, Netaji Subhas Road; all of Calcutta.

1403 P.C., Bombay—Following is a formula of groundnut toffee: Sugar 3 Lbs.; Glucose 3 Lbs., Water 1 pint. Cook to 240°F. then add 3 Lbs. of roasted groundnuts, and cook for 10 minutes. Remove from fire and roll out on slate. Cut into small pieces.

1404 J.C.S., Jashpurnagar—Address of Western India Match Co. Ltd. is Wellesley House, 7, Wellesly Place, Cacutta. Squibb's medicines may be had of Martin & Harris Ltd., Mercantile Bldgs., Lall Bazar, Calcutta. Address of Britannia Biscuit Co. Ltd., is 5/1A, Mangoe Lane, Calcutta. Address of National Carbon Co. (India) Ltd. is 28, Pollock Street, Calcutta.

1405 O.M.A., Bombay—To communicate with any querist write him with the number and initials care of "Industry" when your letters will be redirected.

1406 K.G.J, Dharwar—We are not aware of any institution where training is given in injection.

1431 S E, Shillong—Address of Handicraft is Odhams Press Ltd., 93, Long Acre, London W. C. 2.

1432 M M., Rangoon—For preparing gold chloride take gold 1 part; Nitro-hydrochloric acid 8 parts. Gold is dissolved in the acid by the aid of heat. Evaporate the solution to nearly dryness and allow to crystallise. This is soluble in water.

1434 S.V.D, Thika—For all sorts of machines you may enquire of Small Machineries Mfg. Co., 22, R. G. Kar Road; Oriental Machinery Supplying Agency Ltd, P12, Mission Row Extension, International Trading Co, 13, Netaji Subhas Road; Marshall Sons & Co. Ltd., 99, Netaji Subhas Road; Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road; Francis Klein & Co. Ltd., 1, Royal Exchange Place; Standard Machinery Co., 86B, Netaji Subhas Road; Harima Engineering Works, 69/1, Belgachia Road and Dr. Bose's Laboratories Ltd., 45, Amherst Street; all of Calcutta.

1435 B.P., Gwalior—For hernia treatment you may write to Dr. H. C. Ray, Divine Treatment Hall, 118, Upper Circular Roal, Calcutta.

1436 P.L J., Rishikesh—For erecting a furnace for sodium silicate manufacture you should consult a chemical engineer.

1438 R.G., Lashkar—Mantles are knitted from artificial silk fabric, cut into suitable lengths and stitched. These are next dipped in the following impregnating solution: Thorium nitrate 1000 ports; Cerium nitrate 10 parts, Magnesium nitrate 1½ part; Beryllium nitrate 5 parts; distilled water 2000 parts. Mix. The time of immersion of the artificial silk mantles varies from about 2 minutes to about 13 minutes according to the nature of artificial silk.

—REVIEW OF BOOKS

DEVALUATION AND AFTER by Tarapada Das Gupta. Published by N. M. Roy Chowdhury Co. Ltd., 72, Harrison Road, Calcutta-9. Sole Agents: "Kato-Katha", 68-2, Mirzapore Street, Calcutta—9. Pages, 88; price, Re. 1/2/-.

The purpose of this booklet is to study the effects of devaluation and to suggest measures needed for taking the fullest advantage of it. The author's treatment is rather trite and nowhere does the work hit any mark higher than the average. He is critical about Mr. Churchill and others who would like the British Government to repudiate its Sterling debts to India. Thanks to the good sense of Attlee and Company, that kind of evil has been staved off and Britain has not dared so far to scale down her enormous war debts to India But the process of repatriation hitherto followed has slowed down and as a result of devaluation Britain's capacity to pay off her debts has been limited further.

In one of the chapters there is a casual reference to the difficulties created by Pakistan's refusal to devalue its over valued rupee. Most of the other chapters are culled out of newspaper reports, but the author has succeeded in making readable stuff out of these by summarising them ably and well.

The test of Devaluation's efficacy is a two-fold one, namely, its effect on domestic prices and its capacity to provide an incentive to our export trade The author's doubts that India can dispense with Pakistan's jute for any length of time, have not proved false.

A SYMPOSIUM ON FISH CULTURE by V. Satyanarayana. Published by the author from Uratla, Vizagapatam Dt. Pages, 234; price Rs. 5/-.

At a time when the attention of all has been directed towards making up for protein deficiency in our national diet by ensuring a steady supply of fish recognised as a good source of easily digestible protein, this book will serve a very useful purpose being as it is a practical and comprehensive guide on inland fish farming. The author thinks that anybody with a little knowledge of the subject and perseverance can take up fish culture profitably. The book is no original treatise on the subject but a digest of materials culled from various sources Nevertheless the treatment is systematic and the book is based on the Syllabus prescribed by the Madras Government Fisheries Department for training candidates in fish culture.

The opening chapter of the book gives a very brief history of pisciculture and then goes on to explain the importance of fish industry. Fresh water fishery has certain advantages over marine fishery For example, fishes keep the pond water clean of injurious herbs and plants; fish rearing in ponds is easier and there are no such requirements as trained crew and trawlers and other equipments as in the case of marine fishery.

Besides expounding the general principles of fish culture along with practical tips and hints, the book contains a detailed account of all necessary particulars about many different kinds of fish.

CONTRIBUTION OF THE ILO TO PEACE by Edward Phelan. Issued by The International Labour Office, Geneva. Pages, 26; price, 10 cents or 6-d

The author has been associated with the ILO from the first and his knowledge of its history is claimed to be unrivalled. He is a former Director-General of the Organisation. In this pamphlet which is reprinted from an article in **International Labour Review** the author shows how during the last 30 years of its existence the ILO has steadily pursued its mission of contributing, within the framework of its Constitution, to the building up of a system of world peace

The ILO's aim is pacifist, but the ILO does not believe in sentimental pacifism Being wedded to the ideal of rational pacifism it knows there are things worth fighting for During the war, for example, the ILO made important contributions for the improvement of industrial relations and this strengthened the hands of the nations who were struggling for the victory of democracy. The system of tri partite discussion which the ILO had employed in international meetings from the beginning, was adopted with success in Britain, the USA and certain other countries during the war.

The immediate task of the ILO is to promote the betterment of conditions of labour, but that does not mean all its work has been confined to this task only. The author, however, agrees that the scope of the United Nations in the matter of promoting world peace and goodwill among mankind is much vaster.

REPORT ON THE WORK OF THE INDIA GOVERNMENT TRADE COMMISSIONER FOR CANADA AND NEWFOUNDLAND, TORONTO by M. R. Ahuja. To be had of the Director-General of Commercial Intelligence and Statistics, 1, Council House Street, Calcutta. Pages, 157, price, not mentioned.

The Report under notice contains materials which businessmen both here and in Canada as well as Newfoundland will find helpful in forming an estimate of the possibilities of Indo-Canadian and Indo-Newfoundland trade The Report covers the year 1948 and is full of statistical details in support of its many valuable statements and suggestions.

The author requests all those interested in the expansion of Indo-Canadian trade to go through Chapter IV of the Report in which he discusses the future prospects and posibilities of trade between the two countries The following extract from the Report shows the present position of Indo-Canadian trade:—

"The total value of the Indo-Canadian trade during 1948 was slightly in excess of 67m dollars, which, compared with the 1947 value of over 85m dollars, represents a substantial decrease of approximately 18m dollars, or slightly over 26 per cent. The decrease in the total value of the trade during 1948 is shared almost equally between imports and exports, as both were reduced by about 9m dollars leaving a small net balance in favour of Canada, as in 1947. This substantial reduction in the Indo-Canadian trade may at first sight appear alarming and perhaps due largely to the many controls and restrictions in force during the year, both in India and Canada. Actually, the apparent substantial decrease in the Indo-Canadian trade during 1948 would almost disappear when it is remembered that while the statistics for 1948 represent Canada's trade with India alone, that is excluding Pakistan, similar figures for 1947, as for previous years, related to the whole Indian Continent, that is both India and Pakistan."

Newfoundalnd, now included in Canada as its tenth Province, is mainly an agricultural country. But what it produces is not enough for its own requirements and consequently, the country has to import vegetables, fruits, feeds for animals and packing-house products of all types. During 1947-48 its fishing industry contributed nearly 36 per cent of its total exports. Its secondary industries have a limited output. Its pulp and paper industry is well developed and, next to Canada, Newfoundland is now the world's largest exporter of newsprint. According to the Report under notice, "Newfoundland's domestic exports to India for the fiscal year ended March 31, 1948, amounted to 216,739 dollars which is a decrease of 161,560 dollars from the previous year's figure of 378,299 dollars; the oily item of export to India during the year being 3,446 cwt of newsprint". Newfoundland's imports from India fell from 8,975 dollars in 1947 to only 363 dollars in 1948.

Mr. Ahuja is not in the least disappointed over the decline in both volume and value of the Indo-Canadian trade which he attributes to a general shortage of both dollars and goods at competitive prices. He says in this connexion: "Due largely to the scarcity of dollars and the priority for their expenditure on more essential goods and services, India was obliged to introduce measures to restrict imports from Canada of the less essential items. In pursuance of a similar programme for conservation of United States Funds, Canada too was compelled to put into force restrictions of a similar character."

The author thinks that "judging from the numerous enquiries received, there appears to be a growing demand both in India and Canada for each other's products". Also, India's policy of liberalization of exports to the hard currency area should augment appreciably exports to Canada. As we know, devaluation of the Indian Rupee in terms of dollars was resorted to in September last year for the purpose of providing an incentive to our exports to the dollar area. Recent reports show that the device has not fizzled out and there has been an increase of our exports to both hard and soft currency areas.

Urging exporters to improve the quality of their goods and revise their prices in the light of the competition offered by exporters of other countries in the matter of selling their goods to the hard currency area, the Report adds: "However good and encouraging either the past record or the future prospects for Indian imports into Canada, the conduct of international trade and our own dire need for a legitimate and fair share in the trade warrants constant vigilance and study. In Canada, as in other parts of the world, the seller's market is being replaced by a buyer's market, and in order to compete in this lucrative and expanding market, Indian goods must more and more meet the exacting requirements of the discriminating consumer.—It is common knowledge that most countries of the world, to a greater or lesser degree are hungry for U. S. dollars and are consequently bending every effort in order to export more and more to the hard curency countries. India is no exception, and her increasing needs for export markets in the hard currency areas are of such vital importance for the development of her industry and economy that a really dynamic export policy must be formulated and effectively carried out". The Report also contains suggestions for helping the Indian exporter to enter the Canadian market.

NOTICES & REVIEWS

(Manufacturers sending specimens and samples of their products for notice and review may please note that no notice is published of medical preparations and allied substances in this section.)

INSURANCE VADE MECUM

We are glad to receive a copy of Insurance Vade-Mecum for 1949-50 compiled by S. C. Tuli. This is a collection of insurance figures and statistics for the agent, insurer and the insurement. It is published by The Insurance Publicity Company, 46, Daryagunj, Delhi. Its price is Rs. 4.

INDIAN FOREST LEAFLET

We have received a copy of Indian Forest Leaflet No. 108 "Studies on Adhesives" dealing with the preparation and application of whole blood meal adhesives in making plyboards. It is published by The Forest Research Institute, Dehra Dun, U.P.

TRADE ENQUIRIES

(To communicate with any party write to him direct with name and address given below mentioning Industry).

1317 Vishwanath Pd. Gupta, 506, Piari Bhawan, Benaras—Wants to be put in touch with the manufacturers of brass balls of 3/32" and 5/32" diameter.

1325 United Import & Export Co., P.O. Box 74, 26, Dam Street, Colombo 11—Want to be put in touch with the suppliers of hairdye brushes of bamboo handle.

INDUSTRY

EARN Rs. 1024.

- **NO INVESTMENT!**
- **NO HARD WORK!!**

NOT A LOTTERY — NOT A CHEATING

A REAL BUSINESS OFFER :

Send **Rs. 4-12-0** by M.O. to-day, towards the cost of 1 Bottle of "*Sweet-Heart*" an enchanting American perfume. **On receipt of this amount we will send a** registered Parcel to you, **containing the above bottle and 4 "Agency forms,"** enlisting you as one of our **"Chief Agents," in our sales organisation.**

YOUR SIMPLE DUTY :

Now, your duty is only to show this **Bottle of "*Sweet-Heart*" to 4 parties** and enlist all of them as our **Agents, asking them to send Rs. 4-12 each by M. O.** filling up the 4 agency **forms separately. Enclose the 4 M. O. receipts to the** 4 agency forms and send the same to us. ***Now Your Business is Over.***

YOUR AGENT'S WORK

Each of the 4 agents whom you have introduced to us, will be supplied with one bottle of "*Sweet-Heart*" and 4 "Agency Forms." They have to work just as you have worked in your case, in order to see that they would also get their anticipated amount of **Rs. 1024/-** each.

HOW TO EARN Rs. 1024/-

Six places have been provided in the above mentioned "Agency Forms." Soon after we receive your M. O. of **Rs. 4-12** you will be treated as our "Chief agent" and your name will be mentioned in the 1st. place, in 4 "Agency forms" those will be supplied to you. If the 4 agents introduced by you will work unfailingly, as you have done, your name will be carried over to the 2nd. place in (4×4) 16 forms., and their names will be kept in the 1st. place. Automatically when every new agent enlists 4 parties, your name will be carried over to the 3rd. place in (4×4×4) 64 forms. According to the same mathematical calculation (4×4×4×4×4×4) your name will be mentioned in 4096 forms, in the 6th. place. At this stage you are entitled for a sum of **Rs. 1024/-** at a commission rate of Re. 1/- per each Bottle, towards your remuneration. This is only feasible, when every new agent introduces 4 new parties without fail. We feel sure that they do no fail as they will also get the above mentioned amount, when their respective names occupy the 6th. place.

WHEN YOU WILL RECEIVE :

The remuneration mentioned above, will be sent to you once in a week by M. O. as and when your name is seen in the 6th. place of the "Agency Forms."

A SOUND PLAN :

We once more stress on the point that this is not a lottery but only the fruit of your earnest labours. There is neither duping nor deceiving anybody. You are entering into a well planned business organisation and you will have your remuneration without fail.

Please Remit Rs. 4/12/- By M. O. Writing Your Name and Address in Block Letters in the M. O. Coupon. No, V, P, P, Will be Sent,

A SINCERE SERVICE :

If you are not interested, please handover this announcement to your friend or a well wisher, who will be really benefitted. There is nothing for you to loose but everything to gain. Help yourself by helping others. ***This is a Great Social Service to the Unemployed, The Needy and to The Nation as well.***

(SCHEME COPY RIGHT)

THE NATIONAL ENTERPRISES,

Importers, Exporters, Publishers & Advtg. Agents,

P. O. AKIDU, W. GODAVARY, (MADRAS).

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EDITORIAL CONTENTS FOR SEPTEMBER, 1950

BUSINESS NOTICE.

SUBSCRIPTION DEPARTMENT.

Annual Subscription, Indian ... Rs. 8/-
Foreign ... Sh 12/-
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Single Copy (ordinary issue) ... As -/8/-
" " Special Issue (4 times a year) ... As. -/10/-
" " Foreign ... ... Sh 1/-

Subscribers are enlisted at any time of the year for a period of 12 months. Subscribers will receive 12 issues in all beginning with the issue for the month of enlistment. Subscribers are not enlisted for any period less than a year.

Subscription money is always payable in advance or by V.P.P.

ADVERTISEMENT DEPARTMENT.

Last day of accepting advertisement is the 10th day of the previous month. Any order for alteration or correction of copy is not entertained after that day.

Advertisement rates for ordinary and special position, both casual or contractual, are sent on request.

CORRESPONDENCE.

All enquiries regarding industrial or business information should be addressed to the Editor. Contributions and articles for review and notice should also be sent to him.

All enquiries regarding the Subscription or Advertisement Departments should be addressed to the General Manager.

OFFICE HOURS.

Editorial Department — 11 A.M. to 4 P.M. on weekdays and 11 A.M. to 2 P.M. on Saturdays.

Subscription and Advertisement Department 10 A.M. to 5 P.M. on weekdays and 10 A.M. to 2 P.M. on Saturdays.

CLASSIFIED BARGAINS

[illegible] under this head of small announcements cost 4 As. per word, minimum [illegible] payable by Postage Stamp or M.O. with order. No vouchers given.

Readers—In writing to advertisers the Readers are requested to write legibly and quote [illegible] they are writing in response to advertisement in INDUSTRY. This would ensure prompt attention. Letters to Advt. No. should be duly stamped.

LIST OF CLASSIFICATIONS.

AGENTS WANTED

For Calendars, Diaries, Handbags, Purses, Hand-Gloves, Apply Bengal Leather Industries, 10/c, St., James Square, Calcutta. 616 AA

Bangalaxmi Leather Works, 10/B, St., James Square, Calcutta—Wanted Stockists for money Purses and Ladies Hand Bags. 621 AA

Tanned Leather of all descriptions. Wanted Agents. East India Trading Company. Post Box 587, Calcutta (India). 580 AA

Baby Malam—a Stainless analgesic ointment for all skin diseases; Madhab Balm—a Pain Balm. Wanted Agents. Madhav & Co., Jorasanko, Calcutta. 625 AA

D. D. Malam—A Soothing Ointment for all Skin Diseases, never stains on clothes. Wanted Agents, Mahatma & Co., Jorasanko, Calcutta 7. 644 AA

Wanted Agents to Earn 300/- Monthly working for Embossers, Nameplates, Locks & Framing machines Apply International Industries Ltd., Aligarh. 629 AA

For "Organisers and Agents" on suitable terms, apply Oriental Provident Insurance Ltd. [illegible] Canning Street, Calcutta. Phone Cal. [illegible] 638 AA

"Wanted agents for all kinds of buttons, sewing thread balls and other tailoring materials. Apply Industrial Distributors P.O. Box [illegible] Karolbagh New Delhi." 255 AA

[illegible]—Cantharidine Hair Oil each Rs. 1-8 [illegible] Bandage Rs. 1, Neem-Chaulmugra [illegible] As. 8, Pancreated Magnesia Rs. 1-4, [illegible]. Bagmedar & Co., 4, Ganapat [illegible] Road, Calcutta. 632 AA

AGENTS WANTED.

Musk, Saffron, Asafoetida, write for price list. D. Raj & Sons, Katra Doolo, Sirki Bandan, Amritsar. Agents wanted. 744 AA

Wanted Agents for printing work. Letter, Bill, Order forms etc. @ Rs. 8/14/- per 1000. Apply to:—Ajmeri Gate Press, Delhi—6. 884 AA

Wanted Agents to secure advertisements for Indian Hosiery Journal. Journal's Publication, Purana Bazar, Ludhiana.—(India). 770 AA

Directory contains 2000 newspapers, magazines addresses of England, America, India, Rs. 2/- Wanted Agents, Haralal, Vakilpara, Delhi. 746 AA

Dry Colours:—Chinese & Prussian Blue, Chrome-yellow, Fast Red, Etc. Wanted Agents & Stockists everywhere. Indian Chemical & Colour Works, 66, Simla St., Calcutta 6. 759 AA

Wanted Agents & Stockists for "Rassko" Metal-polish Cellulose & Thiner Etc. For polishing Brass, Copper, Tin, Zinc, Steel, Aluminium & Nickel etc. Rassko Chemical Products, 10, Lower Circular Road, Calcutta 17. 545 AA

"Wanted Agents to secure orders for our attractive Calendars liberal terms, attractive commission. Write to day:—The Empire Calender Mfg. Co., P.O. Box No. [illegible] Calcutta 7. 469 AA

Wanted Agents & Stockists to sell cheap rubber balloons. Your name printed balloons. Gas filling tank. Rubber chuchu toys Dwarka Das. Third Bhoiwada, 38Y, Bombay 2. 463 AA

Wanted Agents and Stockists for our renowned "Sakti Malam & Hat-Kata Tail" for Assam, U.P. & C.P. Terms attractive. Write to: Sakti Chemical Works, 10-11, Upper Circular Road, Calcutta. 384 AA

"Wanted Inspectors and Agents on salary and commission for selling our newly floated shares permitted by Central Government. The Peerless Life Assurance Co., Ltd., 35, Chittaranjan Avenue, Calcutta." 577 AA

Wanted Agents, Stockists for Pearl Tooth-Powder. Cuckoo Boot-Polish and Fountainpen Ink. Samples and order book against Rs. [illegible], Pearl Products, 52B, Mofidul Islam Lane, Calutta—14. 759 AA

Wanted:—Wholesale Dealers for our own make first class "Mullick" Brand Rotary Treadle Sewing Machines. Thousands are already in actual use with reputation. K. C. Mullick & Sons, Ltd., 77-12, Dharamtalla St., Calcutta. 684 AA

Wanted:—Agents and Stockists for our wonderful medicine "Saletine" a powerful remedy for constipation dyspepsia, acidity, indigestion and all sorts of stomach troubles. J. Smith & Co. P. O. Box No. 2209, Calcutta. [illegible] AA

St. Ford's Bankink (Extra fine record Ink), Stickal (Country Glue), Travel Gum (2 oz. & 4 oz. Fancy Phials with rubber [illegible]), Fountain pen Ink, Paragon Writing Ink & Inkit (ink powder), and famous Royal Elephant Brand White Glazed Twine Balls. Wanted Agents. Chemproducts (India), Limited, 12, Tamer Lane, Calcutta. 581 AA

AGENTS WANTED.

Pure Hira Hing one tola packet Rs. 2/- per Doz. Wanted Agents. Hing Stores. P.O. Gurgaon, Punjab. 721 AA

Wanted Agents both sex to earn Rs. 300/- monthly securing orders for locks embossers Name-plates etc. Samples free. Narottamdas & Co, Pakki-Sarai Aligarh, U.P. 236 AA

"Wanted agents in unrepresented areas for 'Kisan' Radios, Moradabad wares and plastic goods, Kumar Ltd., Moradabad. 472 AA

Wanted Agents everywhere, write imme-diately for terms and samples Anil Ink Manufacturing Company, Shah Khaki, Meerut. 773 AA

Wanted Agents—Throughout India and abord for canvass Advertising Packing Tape. Aply, The India Advertising Tape Factory, 4-B, Kurla, (Bombay). 556 AA

Wanted Agents to canvass orders for our Bhavani Carpets on Commission basis. Apply to.—V Lakshmi & Co. Bhavani, (via), Erode. S. I. R 704 AA

Wanted agents for U.S.A. Fountainpens on commission or pay Rs. 300 to 800. Royal Corporation (I.C.) Qutab Road, Delhi. 718 AA

Wanted District & Travelling Agents for Silk Hosiery, Cutlery, Fancy and Sundry goods on liberal commission. K. N. Kumar & Bros. 6/1, Karol Bagh, New Delhi—5. 261 AA

"Wanted Agent or distributor for our printing inks in different provinces· Apply, Sanyal Lahiri & Co. Ltd., 9A, Mahendra Srimani Street, Calcutta 9. 781 AA

Wanted Travelling Canvassing Agents and Customers on Liberal Commission Basis, for Bhavani Carpets and Carpet Bags Apply to:— The Ganesh Industrials Carpet Manufacturers, Bhavani, P.O. via Erode, S. India. 757 AA

Wanted:—Agents, Stockists for a India (buttons gold-plated). 3 years guaranteed. Terms attractive. Sample's cost Rs. 10/. Universal Traders 1/1A, Subol Chandra Lane, Calcutta—9. 435 AA

Wanted Travelling Commission Agents to canvass orders for our fine attractive Handloom Carpets, Shirtings & Coattings etc., for terms Apply sharp to·—The Swadeshi Industrials Bhavani,—S. India. 748 AA

Famous "Mill" Brand Marking Crayons & Cloth Stamping Inks. Also manufacturers of Medical & Commercial Plaster of Paris. Capital Industries Limited. Serai Rohilla. New Delhi 5." 777 AA

Wanted Stockists & Wholesale Dealers for Rubber Balloons, Toys, Plastic Novelties & Shaving Brushes. Prakash Industries, 3/3, Maharshi Debendra Road, Calcutta—7. 214 AA

Wanted Canvassers, to earn Rs. 500/- monthly, working for Name Plate, Embossers, locks & revalvers, on easy terms. Apply:—BALL'S MFG. CO. (I.C.) ALIGARH, U.P. 204 AA

Wanted Agents for Plastic & Jessore Combs, Plastic Hair Clips and M.O.P. & Nut Buttons. Samples Rs 6 for Combs and Rs. 5 for buttons, refundable. Most Suitable Terms. Luxmi Narayan Comb Factory, P. O. Box No. 11436, Calcutta 6. 306 AA

Applications are invited from the respect-able dealers with sound financial position and long experience in selling Kimam, Zardah, Kesarbilas etc, to act as Dist·ibutor on district basis for the provinces of Madras, Bengal, Bihar, Assam, Orissa, & C.P. for our famous products, Lily Kimam, Mohini Zardah, Kesar bilas, all sorts of betal spices and perfumes, Lily Tobacco Products 43, Indrani Park, Tollygunge, Calcutta 33. 773 AA

[illegible]

Wanted stockists and [illegible] Southern India, States, U.P. & C.P. [illegible] and push sales of our medical [illegible] Bengal Health. 6, Harimohan Roy [illegible] Calcutta—15. 773 AA

"Wanted Agents to secure orders for our 'Suksham Ayurvedic Family Doctor Box' containing 36 medicines in Homoeopathic form efficacious, simple & easy. Sample Box @ 12/- with Materia Medica. Swarn Homoeo Pharmacy, 1160, Ramjas Road, Narhi, Lucknow." 632 AA

AGENCIES WANTED

Agency wanted for Delhi, U.P., & Punjab for Galvanised Buckets & Hardwares. Mohansingh, Kharikuan, Meerut City. 780 AG

"Increase your business by giving Agency to Venus Trading Co. Box. 3601, Nairobi (Africa)." 769 AG

Agencies Wanted for Chemicals, Minerals, Paints. Glass and all varieties of Raw and finished products. Dawn & Co., 11, Portuguese Church Street, Calcutto (Estd. 1908). 601 AG

Manufacturers Distributors in advertising accessories & novelties in plastic may Contact us:—The Indian National Traders (Regd.) Gorakhpore. (U.P.). 20 AG

"Agencies solicited for Bombay from re-liable Manufacturers. Any line. First class references Contact· Dutt, Glass House, Turner Road, Bandra, Bombay." 679 AG

Wanted wholesale Indian Carpets; Arts and Crafts; Silk, Sarees; Tea, Coffee; Cocoanuts; Cashewnuts; Dry Fruits; Indian Musical Instruments; Postage Stamps: Please write sending samples if possible with details to:— Nativity Viegas, Post Box. 1085, Bombay. 788 AG

BOTTLE & CORCK

Radha Bazar Bottles Stores, 15, Radha Ba-zar Lane, Calcutta 1. Bottles Phials, Cork Products etc. Phone: Bank 6794. Tele: "Korkbag." 602 BC

Nath & Bros., 67, Ezra Street, Calcutta. Dealers in Empty Bottles, Phials, Corks. 619 BC

We manufacture mould for glass wares e.g. files bottles, etc. A. M. Banerjee, 34, Ezra St., Calcutta. 427 BC

Ashini Kumar Dass & Co., 190, Lower Chitpore Road. Calcutta Importers of Bottles phials corks capsules, etc. 641 BC

Krishna Silicate & Glass Works, Ltd., 27, Radhabazar Street, Calcutta. Manufacturers of Bottles & Phials of every description. 618 BC

Fancy White Bottles, Phials, Corks, Caps, Etc. Enquire C. G. Depot, 15, Parsi Church Street, Calcutta-1. 669 B.C.

Shanti Bottle Stores, 66, Ezra Street, Calcutta. Importers & dealers of all sorts of Bottles, Phalls, Corks etc. 691 B.C.

Bimal Bottle Stores, 120, Radhabazar St., Calcutta. Dealers & Importers of empty Bottles, Phials, Homoeo Phials, Glasswares & Corks of all description. 632 BC

United Bottle & Surgical Co., 26/1, Lal Bazar Street, Calcutta 1. Manufacturers, Representative and Dealers of Bottles, Phials, Corks. Surgical Instruments & Surgical Cotton, Telegram: Bottle. 701 BC

San-Tesh & Co., 56, Brabourne Road, Cal-cutta—1, Coloured & Whitte Bottles, Phials, Cork Products, Capsules, Caps, Sandal Oil, Stiaric Acid. Etc., Telephone: Bank [illegible] Telegram: Santexko. 727 BC

[illegible] Calcutta 1. [illegible] BS

BOOKS & PERIODICALS

Latest Useful Books. List free. N. K. Paul & Sons, P.B. No. 13202, Calcutta. 741 BK

"Indian Hosiery Journal, Monthly review, Rs. 8/-. Indian Hosiery Directory, Detailed Informative, Rs. 3/- Journal's Publication, Ludhiana. 470 BK

BUTTON & IVORY

Wanted Agents & Stockists for our Horn Combs, Samples against Rs. 4/-, Kamala Button & Comb Mfg., Works., 24/4, Beniatola Street, Calcutta—5. 432 BI

CARDBOARD BOXES

Bengal Cardboard Industries & Printers Ltd., 165, Cornwallis Street, Calcutta—6 Manufacturers of cartons, rigid or collapsible cardboard containers, calendars, cut-outs, cups for ice-cream, cigarette shells and slides etc. (printed or plain). 461 CB

CRUDE DRUGS

Musk Sonamakhi, Salabpanja, Rhubarb Taraxicy, Lobelia, Valerian etc., Apply GPO Box 2454 Calcutta. 774 CD

G. K. R. Chetty & Co. 12, Thatha Muthiappan St, G. T. Madras. Wholsale Drugs, Herbs, Roots & Spices Merchants." 692 CD

Crystal Stone, Beautiful Quartz, Angelica, Herbs, -/12/- in stamps for samples & rates. The Bhalla Emporium Batala. (Punjab). 715 CD

Bansidhur Dutt, 126, Khengraputty Street, Calcutta Botanical Crude Drugs, Spices, Gums, Waxes, Mercury, Starch, Poisons, Heavy Chemicals. 624 CD

P. C. Dawn & Co., 1, Machuabazar Street, Calcutta. Botanical Crude Drugs for Allopathic, Homoeopathic, Ayurvedic & Hakimi Medicines 628 CD

Bengal Herbs Stores, 2, Mullick Street, Calcutta, Hingul (Mercury Sulphur Compound) Murdasankha, Red Lead, Mercury, Belledona, Liquorious Root, Raowolfia Serpentina, Senega, Cinchona, Spices, etc. 722 CD

CARBON BRUSHES

The Calcutta Carbon-Brush Manufacturing Co, Post Box No. 2495, Calcutta. Importers and manufacturers of Carbon-Brushes Telegrams:—Calcarb. 652 CR

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For Scissors & Razors:—Vikram Scissors Industry. Tirgaran, Meerut City. Catalogue sent free. 780 CT

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Government Registered Colleges Highest Diplomas in Homoeopathy & Biochemistry in easiest terms. Prospectus free from International Institute (Regd.), Aligarh. 782 ED

[illegible] sharp to: [illegible] Baroda.

ICE-CREAM PAPER CUPS

"We specialise in manufacturing Ice-cream paper cups 2 oz., 4 oz., 6 oz., 8 oz. & 10 oz. (printed or plain). Bengal Cardboard Industries & Printers Ltd., 165, Cornwallis St., Calcutta—6. 461 IC

LABELS

Woven Neck Labels & Transfer Labels Manufacturers. R. G. Pal & Co., 110/2, [illegible] Street, Calcutt 5. [illegible]

MACHINERY & HARDWARE

"We hold Huge Stock of Typewriters and sell at cheapest price. Asiatic Typewriter Co., 6, Hastings Street, Calcutta." MA, 767

For Tannery Machines, Shaving Staking, Boarding, Buffing, and drum. Write to A. K. Banerjee, 34, Ezra St., Calcutta. 427 MA

Ven Trading Co., 9, Clive Row, Calcutta. Dealers, stockists for both new & 2nd Hand Engines, Boilers & other Machineries. 635 MA

Genuine Typewriting parts, springs and accessories. Consult R. S. Typewriter Co., 132, Clive Row, Calcutta 7. 646 MA

We make machines for making — Soap, Lozenge, Biscuit, Candle, Tablet, Ointment, Nail, Tile, Toys, buckets, Tin-containers, Cardboard Box, etc also Printing, Book Binding, Agricultural, Wood Working etc. machines, Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta 1. 641 MA

Cigarette manufacturing plants and machinery (foreign make) for sale. Please write for particulars and terms: Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta 4. Phone: B.B. 3858. 425 MA

We Manufacture Machines for Soap, Lozenges, Biscuit, Chocolate, tablet making, Pharmaceuticals, Paint and Paste, Grinding, Mixing, Chalk stick mould etc. Small Machineries Mfg. Co., 22, R. G. Kar Road, Shambazar, Calcutta—4. Phone: B.B. 3858. 425 MA

MEDICINES

Asthma cure guaranteed:—Get it on your chest no relapse, Rs. 12-13 week. Dr. Sherman, 28, Ramdhone Mitter Lane, Calcutta. 495 MD

D. D. Eye Lotion—A Soothing Lotion for early relief of Sore-eyes, of watering discharge, grittiness, redness etc. of eyes. Mahatma & Co., Jorasanko, Calcutta—7. 644 MD

4 Doses Kalpanaleaf cure Hernia, Hydrocele, without knife Rs. 1-4-0, Guaranteed Piles Healer Rs. 1-4-0 Kaviraj, 1, Bhimghosh Eye Lane Calcutta 6. 692 MD

Tiger Fat for Rheumatism, Gout, Palsy, Paralysis, Re. 1-4 per tola. Lotus Honey—for eye troubles Re. 1-8 per dram. Sil & Co., 346C, Upper Chitpur Road, Beadon St., P.O. Calcutta. 617 MD

Asthma, Hernia, Hydrocele, Hysteria, Piles, Diabetes cured successfully on money back guarantee. Trial medicine Rs. 2/-. Dukhbhanjan Karyalaya P. O. Kashipur, Nainital. 703 MD

Golden Eye-ointment 1 per cent 0.5 per cent in collapsible tubes and various eye-ointments available at Competetive Rates ask detailed price-list Phillip Chemical Works, 56/B, Beadon Street, Calcutta—6. 669 MD

MEDICINES.

"Nethrol." For all Eye-troubles. Stockists and Agents Wanted. Hindustan Medical Hall, Mattancheri, Cochin. 589 MD

"Male's invalidness' cured Guaranteedly by Shaktida Nervent Tonic & Nisha Application medicine Shakti Ayurved Mandir Ltd, Chomu, Jaipur. 776 MD

Medico Chemical Laboratory, [illegible] Kissen Street, Calcutta. Manufacturers [illegible] tubes, glass syringes, ampoules, [illegible] etc.

MISCELLANEOUS ADVTG.

Do you feel handicapped with your Glasses? You can discard them for better vision by special Visual Training Sight Saving Service, 134-4 Cornwallis St., Calcutta 4. 588 AD

Pure real Saffron (Kesar), Kasturi (Mushk), Amber, Pearls, Shilajit Hing and Himalayan-Products Price-list free on application Bharat Jain Aushdhi Bhandar, Post Box No 26, Amritsar 268 AD

For best quality Tent, waterproofed Canvas and Tarpaulins, please enquire — Calcutta Proofing & Paulin Manufacturing Co 198, Circular Garden Reach Road, Calcutta —23 771 AD

PATENTS & TRADE MARKS

Dutt & Co., Patent Design & Trade Mark Agents Prompt and efficient services guaranteed, 82, Harrison Road, Calcutta. 630 PT

PERFUMERY & TOILETS

Start Industries Fight Depression. Get perfumes for any industry from Kadrur and Co, 378, Wilson Gardens, Bangalore 2 594 PA

RADIO & ELECTRIC GOODS

For your Electrical good's & Accessories come & do consult with The Calcutta Electric construction Co, 104/1, Cornwallis Street, Calcutta 4 579 RE

RUBBER GOODS

"Learn Rubber Balloons making by Post or practically. B. V. Misal, Wardha—C P" 688 RG

"For best quality Toy Rubber Balloons, enquire —Oriental Rubber Industries, Wardha C. P." 688 RG

SPRINGS

Sheffield Spring & Steel Co., 135, Canning Street, Calcutta. Springs of all kinds and Machines parts Phone Bank 3974, Telegrams shessko. 639 SR

Modern Engineering Works—Manufacturers of Springs & Spring Washers—Govt & Rly. Suppliers 12, Jadu Pandit Road, Calcutta—6. 509 SR

For quality springs, enquire of British India Spring & Steel Co, 67B Netaji Subhas Road, Calcutta. Telegram—Springsman, Phone Bank 3154 623 SR

SCIENTIFIC APPARATUS

Scientific Glass Apparatus Co., 5A, Prosono Kumar Tagore Street, Calcutta —Manufacturers of Ampoules Test tubes, Hydrometers, Glass Apparatus of all description for Hospitals Colleges & Laboratories. 620 SA

SALE & PURCHASE

Sell Fancy Plastic Novelties [illegible] Sample box Rs 6/- Motiwala third Bhoiwada 38H, Bombay 2. [illegible]

Glucose powder required, suppliers quote with samples to —Phillip Chemical Works, Ludhiana (Punjab). [illegible]

SPORTS, MUSIC & ARTS

Sports Goods and Best Lasts at cheapest rates Send trial order with advance to M/s. B. S. Kwatra & Co, Basti Sheikh, Jullundur. 379 SM

SITUATION VACANT

"Wanted Agents in all towns and cities on a monthly salary of Rs 250/- or even more for our Leather & Plastic Chappals Shoes & Sandals Terms attractive Particulars & Application forms from Orient Footwear Co, P Box 324 Kanpur against payment of Re. 1/- in advance by Postal or Money order." 784 S.V.

SOAP MATERIALS

H. L. Sheme & Son, 30/2/A, Darpanarain Tagore Street, Calcutta—7. Suppliers of Soap Materials 670 SL

TEA & CONFECTIONS

B. K. Saha & Bros., Ltd., 5, Pollack Street, Calcutta. Dealers in wholesale Tea Trade. Telegram: "Holselti," Telephone Bank 2403, 4920. 516 TC

Swady Tea Co., 206, Cornwallis Street, Calcutta—6. Dealers in wholesale Tea Trade. Packets & loose. Telegram "Chachakra". B.B. 5009. 507 TC

Tea Chamber Ltd., Darjeeling. Branch 218, Harrison Road, Barrabazar, Calcutta 7. Phone: B B 797 Wholesale & retail dealers for all sorts of mose and packet teas. 754 TC

TIN BOXES.

Bengal Tin Box Mfg. Co., Ltd., 1, Jadu Mitter Lane, Calcutta—4 Phone B.B. 5020. Manufacturers of Printed Tin Containers of all descriptions. 585 TB

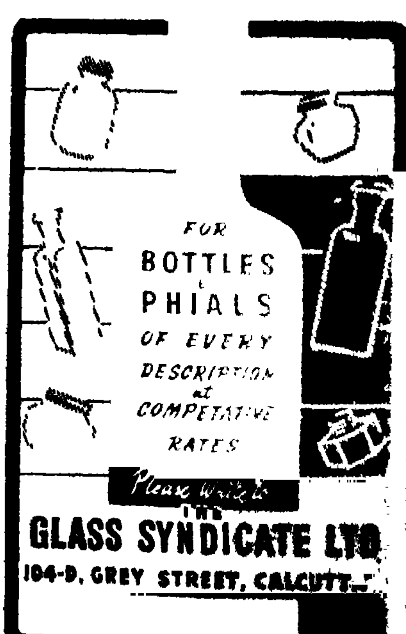
WEARING APPARELS

If it is Superb Hosiery come to us. We distribute them wholesale. S. C. Lahiri & Co., [illegible] Cross Street, Calcutta. [illegible] WA

Always Insist on D. N. Bose's Hosiery Factory Renowned "Sankha and Padma" Brand Ganjee Really durable and best 35-1A, Sarkar Lane, Calcutta. [illegible] WA

When Starting Hosiery Concern, consult free, Formost Experts, Gulta & Co., Ludhiana (India). 470 WA

"Can supply pure best woolen shawls, alwans pushmeenas mufflers pullovers [illegible] etc Complete samples By Y. E. P. [illegible] Knitting Factory, Almora U.P. [illegible]



FOR
BOTTLES
PHIALS
OF EVERY
DESCRIPTION
at
COMPETATIVE
RATES
Please Write to
THE
GLASS SYNDICATE LTD
104-D, GREY STREET, CALCUTTA

[illegible] TESTED SEEDS JUST UNPACKED

SELECTED SEEDS GIVES SELECTED FRUITS.

BEANS (French)

Names.	Per Oz. Rs.	As.	P.
Re[illegible], White & Yellow (Rs. 3 per seer)	0	2	0
[illegible] Soya	0	2	0

BEANS (Indian)

A[illegible]	0	[illegible]	0
G[illegible]	0	[illegible]	0

CABBAGE

Globe Glory	2	8	0
Florida header	2	8	0

CAULIFLOWER

Snowball Late & Early	[illegible]	0	0
Globe Better	4	0	0
Benares Late & Early	2	0	0

CARROT

Long Orange	1	2	0
Nantas	1	2	0
Oxhert	1	2	0

LETTUCE

Big boston	1	10	0
Paris cos	1	10	0
All Season	1	10	0

ONION

Giant	1	8	0
Early Red & White	1	8	0
Patna & Bombay (Rs. 20 per seer)	0	12	0

PEPPER

Chinese Giant	2	0	0
Surjamoni (Very Hot)	2	0	0
Jaipuri (Achar purpose)	2	0	0

RADISH

Bombay No. 1 (Rs. [illegible] per lb.)	0	8	0
Kanthi (Rs. [illegible] „ „)	0	8	0
Round Red	1	[illegible]	0
Giant (Japanese)	1	[illegible]	0
Newar (3 ft. long)	1	[illegible]	0

EGGPLANT (Brinjal)

Names.	Per Oz. Rs.	As.	P.
Muktakeshi	1	[illegible]	[illegible]
Cooly (Cluster)	1	[illegible]	[illegible]
All Season	1	[illegible]	[illegible]
Ramnagar	2	[illegible]	[illegible]
Six Seers	1	[illegible]	[illegible]

BEET

Red Round	1	[illegible]	[illegible]
Egyption & Eclips	1	[illegible]	[illegible]

PEAS

Olanda (Rs. 3 per seer)	0	[illegible]	[illegible]
Darjeeling (Rs. 3 per seer)	0	2	[illegible]
American (Wrinkelled)	0	4	[illegible]

KOHLRABI (Knol Kohl)

Red & White	1	[illegible]	[illegible]

TURNIP

Red & White	1	[illegible]	[illegible]

TOMATO

Excellent & Parfection	2	12	[illegible]
Matchless & Large Red	0	14	[illegible]

Bittern Gourd Uchhey	0	[illegible]	[illegible]
Bottle Gourd Long & Round	0	[illegible]	[illegible]
Cape (Gooseberry)	2	[illegible]	[illegible]
Celery Red & White	1	4	[illegible]
Club Gourd (Nenua)	0	2	[illegible]
Corn Indian (Rs. 55 per Md.)	[illegible]	2	[illegible]
„ American	0	4	[illegible]
Cow Pea Red & White	0	[illegible]	
Cucumber Indian	1	[illegible]	
„ American	2	[illegible]	
Dilpasand (Tinda)	1	[illegible]	
Kakri (3 ft. Long)	2	[illegible]	
Karella Big	1	[illegible]	
Melon (Phuti)	0	4	
Musk Melon Indian	0	[illegible]	
„ Giant	1	[illegible]	
Mustard Chinese	0	[illegible]	
Okra (Ramtaroi)	0	[illegible]	
Pumpkin Giant	1	[illegible]	
Red Gourd (Kumra)	0	4	
Squash Giant	2	[illegible]	
Sponge Gourd (Jhinga)	[illegible]	[illegible]	
Snake Gourd (Chichinda)	1	[illegible]	
Sweet Potato (Sankaloo)	0	[illegible]	
Saga Palam Rs. 3 per seer	0	2	
„ Sour Palam	1	[illegible]	
„ Choulai	0	12	
„ Lal Sag.	0	[illegible]	
„ Katwa Danta	1	[illegible]	
„ Pooee	0	[illegible]	
Tobacco Hingly & Motihari	1	[illegible]	
„ American	2	[illegible]	
Water Melon Giant & Icecream	1	[illegible]	
„ „ Goalundo	0	[illegible]	
Wax Gourd (Petha)	0	4	

GLOBE NURSERY CALCUTTA-4.

SELECTED FLOWERING SHRUBS

Names.	Each. Rs.	As.	P.
Agati (Bak)	0	8	0
Castrum Nocturnum (Hasnahena)	0	4	0
Gardenia (Gandharaj)	0	6	0
Hibiscus Mutabilis (Sthal Padma)	0	8	0
Hibiscus (Jaba) :— Double—Red, Pink, Yellow, Blue, Orange	0	8	0
Jasminum Grandiflorum (Chameli)	0	4	0
" Arbonscens (Nabomullika)	0	8	0
" Jasmin	0	4	0
" Auricalatum (Jooee)	0	6	0
" Raya (Bela)	0	6	0
" Matia (Bela)	0	4	0
Ixora (Rangan) Alba	0	8	0
" Kalirai	0	8	0
" Rosea	0	8	0
Magnolia Grandiflora	5	0	0
" Pumila (Jahuri Champa)	1	0	0
Michelia Champaka (Swarna Champa)	0	4	0
" Alba (White) China Champa	1	0	0

PALMS

Arica	0	8	0
China	0	8	0
Prichardia	1	8	0
Bottle Palm	0	8	0

CONIFERS

Aurcaria Cookii	3	0	0
Juniperus	0	12	0
Thuja (Pata Jhau)	0	12	0
Chinensis	0	12	0

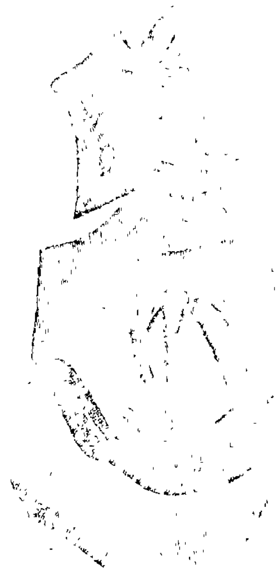
CROTON

Assorted at our selection:—

	Per Dozn. Rs.	As.	P.
Assortment "A"	8	0	0
" "B"	6	0	0
" "C"	5	0	0

ROAD SIDE TREES

	Per Dozn. Rs.	As.	P.
Azadirachta Indica (Neem)	8	0	0
Cassia Assorted	8	0	0
Cassia Fistula (Sondal or Amaltas)	8	0	0
Grevillea Robusta (Silver Oak)	8	0	0
Lagerstroemia Flos-Reginae (Jarul)	8	0	0
Swietenia (Mahagany)	8	0	0
Tectona Grandis (Teak or Saigon)	8	0	0
A Collection of 12 useful assorted Timber and Avenue Tree (Our own selection	8	0	0



	Each. Rs.	As.	P.
American Beauty—Red	1	0	0
Antony-Mouton—Rosy	1	0	0
Advocate—Crimson	1	0	0
Abricot—Yellow	1	0	0
Amie Vibort—White	1	0	0
Beauty of Staple Ford—Deep Gormine	1	0	0
Caroline De Ardon—Red	1	0	0
Captain F. Bold—Red	1	0	0
Duches of Albany—Deep Rosea	1	0	0
Etoile de France—Velvety	1	0	0
Etoile de Lyon—Sulphur Yellow	1	0	0
Elizabeth Vigniron—Pink	1	0	0
Field Marshall—Velvety Crimson	1	0	0
Frau Karl Drushki—Snow White	1	0	0
Glory de Daucher—Deep Red	1	0	0
Golden Fairy—White	1	0	0
Gorgeous—Deep Orange	1	0	0
Gruss an Tapliz—Scarlet Crimson	1	0	0
His Majesty—Red	1	0	0
Lady Hillingdon—Yellow	1	0	0
Mrs. B. R. Cant—Deep Rosea	1	0	0
Monte Christo—Dark Crimson	1	0	0
Ophire—Fawn Salvon	1	0	0
Paul Naron—Rosy	1	0	0
Pearle de Lyon—Salmon Yellow	1	0	0
Pirre Notting—Blakish Red	1	0	0
Rev. J. B. Camm—Pink	1	0	0
William Allen Richardson—Orange	1	0	0

Industry

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THE FISCAL COMMISSION

THE policy that a Government adopts in regulating the imposition of taxes upon commodities greatly influences the economic and industrial development of a country. Hence it is quite in the fitness of things that the fiscal problems be examined critically from time to time and revised according to the exigencies of times, if and as required.

The fiscal policy now followed in India is a system of discriminating protection as recommended by the Fiscal Commission which was constituted in India in 1921 and as a result of this protection has been extended to a large number of industries.

The fiscal conditions having since undergone material changes, the time was ripe for re-considering the situation in the light of the present conditions and hence it was natural that with the independence of India ushering in new responsibilities of economic progress and new senses of values, the Government of India appointed in April 1949 a Fiscal Commission under the Chairmanship of Shri V. T. Krishnamachari.

The Commission's approach towards the problems are particularly welcome on account of the direct treatment of the subject matter in context with the realities and makes a number of recommendations which are likely to have far-reaching effect on the social and economic structure of the country. The recommendations will be found on careful analysis to be sound in principle and appropriate in character for the present conditions of India's industrial development.

A new conception of protection has also been formulated. Due to the absence of free trade at the present moment the cause of discriminating protection loses his edge. In the changed circumstances, the Commission opines that the programme of protection should be geared to the over all national plan for economic development, and that agriculture as an essential step to industrial development should be nationalised. Criteria for the selection of industries for protection have been fixed and programmes have been suggested on short term and long term basis as well.

A fuller account of the Report appears elsewhere.

CURRENT TOPICS

THE PLANNING COMMISSION

It may be remembered that a Planning Commission was appointed lately with persons willing to volunteer their services from all parts of India, for constructive work in connection with the social and economic development of the country. It is a nation-wide non-political organisation to make recommendation to the Cabinet of the Government of India for the economic welfare of the people.

A review of its work in the first three months of its existence shows that its work is now organised through six divisions, viz. (1) resources and economic survey, (2) finance, (3) food and agriculture, (4) industry, trade and communications, (5) development of natural resources and (6) employment and social services. The Commission has already established a procedure for consultation and for co-ordination of its work with the various Ministries of the Government of India. In the States also suitable planning machinery has been set up. The Economic Division which works in close co-operation with the Reserve Bank of India and the Ministry of Finance has examined the basic economic situation in the country with special reference to the extent to which latent inflation now exists and its bearing on price policy. It has also prepared an estimate of the internal resources available and is examining how far it is possible to augment them.

In the field of industry, studies of individual industries are in progress. The subject of these studies is to ascertain the extent to which actual production falls short of installed capacity, the reasons for the gaps which may exist, the steps which may be taken to ensure higher production, and the basis on which programmes of development may be drawn up for different industries. A study of governmental projects in the industrial sphere is also in hand.

The natural resources development division is concerned with power and irrigation projects, coal and minerals, oil, electricity, scientific and technical man-power and scientific research. The phasing of major projects under construction and the measures to be taken to utilise the power resulting from the river valley projects are now being studied.

In the employment and social services division, which covers subjects such as labour, health, education, rehabilitation and public co-operation, special attention is being given to the investigation of industrial housing, social education and problems relating to labour productivity. The Commission is examining the problems of rehabilitation in relation to development programmes.

After completing the study of development programmes and the resources available for development by the Central and the States Governments, the Planning Commission will examine priorities in the public sector to make recommendations to Government. A similar scheme of priorities for the private sector will also be prepared.

The Commission has established suitable consultative machinery. The Planning Commission Advisory Board consists, in the main, of representatives of organisations in the field of industry, commerce and labour, and others in the socio-economic and technological fields. Advisory panels are also being constituted. They will consist of officials and non-officials with special experience and

[illegible] or [illegible]

Courses but should be designed to [illegible] the specific needs of the industry. As regards All-India Certificate Courses, the Council directed that these Courses should be designed to afford opportunities to persons engaged in fulltime or part-time industrial or engineering occupations to acquire further knowledge in the subjects relating to their professions so that they could be more useful. With this end in view the All-India Board of Technical Studies has so far finalised a number of Courses and given affiliation to a number of institutions for certain courses of study. A number of other Institutions have also applied for affiliation to the Council for All-India Courses in respect of certain branches of study.

In this connection, the proposal recently mooted for the co-ordination of higher technical education in the country through a central organisation or University—by whatever name it may be called—deserves close attention. For it is felt that our programme of upgrading the technical institutions in the country and maintaining in them a uniform standard of teaching emphasises the need of such an organisation.

TECHNOLOGICAL UNIVERSITY

The establishment of a Central Technological University for upgrading the standards of affiliated technical colleges and promoting post-graduate specialisation in various branches of technological science was stressed by Sri Nalini Ranjan Sarker, Chairman, All-India Council of Technical Education, addressing the fifth annual conference of the Council at Government House, Calcutta. It is understood from the address that of the four proposed Higher Technical Institutions, the one for the Eastern region which is to be located at Hijli in West Bengal has now far advanced so far as its preliminary works are concerned, and efforts are being made to get it going as early as practicable. As regards the Institute to be located in Western India, the Government of Bombay have provisionally selected a site; and as for the Northern and Southern, the preliminaries regarding the site, etc., have not yet been finalised.

In regard to Diplomas and Certificates which the Council is awarding, certain principles have been formulated and these are since being followed.

The All-India Council for Technical Education directed that the standard of the All-India Diploma and Certificate Courses should be equivalent to that of University Degree and Foremanship Courses, respectively. The Council also directed that in so far as the Diploma Courses are concerned greater emphasis should be laid on the practical side of the Courses.

The idea was that while the All-India Diploma Courses should be equivalent in

TECHNICAL PERSONNEL AND INDUSTRIALISATION

In inaugurating the session of the All-India Council of Technical Education, Dr. Katju the Governor of West Bengal referred to the fact that today young men and women of India were taking in an increasing number to technical and scientific training. This tendency was no doubt caused partially by a patriotic urge to make good the deficiency under which the country was labouring, and partly because it was expected that a technical course would lead to a gainful employ-

ment. If, however, somehow or other, that expectation was not fulfilled, there might be a sense of frustration among the trained young men. Hence while considering facilities for technical education, the question of the employment of qualified people could by no means be set aside. Moreover expert engineers and qualified assistants are required in great number for extension of agriculture as well for increasing food production, an essential subject in these days.

One significant point to notice in this connection is that industrial expansion must keep pace with the expansion of and facilities for technical and technological training. Abandonment or even slowing down of schemes, while in the process of execution, not only leads to waste of public funds but may also have very adverse and undesirable psychological effects on the public mind. In West Bengal we experienced this feeling of frustration when we learnt that the Damodar Flood Prevention Dam Scheme was no longer under active consideration. Reports have appeared that further execution of the Rihand Dam in the Mirzapur district in the U.P. has been abandoned, and all machinery, stores and staff diverted elsewhere. The hydro-electric projects raise great hopes and thousands of young men flock to our technical institutions. But if we abandon them and at the same time go on with development of technical and techonological institutes then we may one day find ourselves faced with a huge unemployment problem.

TRACTOR MECHANISM

Agricultural tractors have not yet been brought into use in thi, country on a scale that is in vogue in U.S.A. and Britain. In U.K. there are as many as three lakh tractors in use. With the programme for attainment of self-sufficiency in food by [illegible] and more tractors [illegible] lopment, West Bengal [illegible] present strength of tractors [illegible] ing 100 can employ profitably [illegible] tractors for intensive cultivation and [illegible] clamation of waste land. Farmers willing to utilise tractors are often disappointed with the breakdown of the machine which generally arises from a lack of knowledge of handling and maintaining them. Hence it is quite reasonable that as more and more tractors come into use there would be a need for an increasing number of mechanics and engineers who are competent to keep the machine always in working condition and repair quickly whatever defect arises any time. With this end of view Messrs. E. M. Allcock & Mohatta Ltd., dealers in tractors and agricultural implements, have organised a new training centre at 32 Chingrihatta Road, Entally, Calcutta for training Indian boys in the mechanism, use and maintenance of agricultural implements. The first batch of students has been selected from among men sent by Government and Government organisations who possess tractors. In future the school will be thrown open to men from labour exchanges or elsewhere, who after they have been there will be able to find good jobs with tractor-owners.

MANUFACTURE OF FILMS

The feasibility of manufacturing raw films in India was discussed at a recent sitting of the Film Enquiry Committee in Calcutta when Prof. Meghnad Saha, a leading scientist gave his evidence before the Committee. Asked by the Committee if raw films could be successfully manufactured in India, Prof. Meghnad Saha said that given proper facilities and encouragement Indian boys could certainly manufacture them. Prof. Saha [illegible]

[illegible] setting up [illegible] factory for [illegible] of raw films in this country. [illegible] had probably been now dropp[illegible]. Establishment of a factory for raw [illegible] manufacture must pass through three [stages]. The first stage viz the laboratory [stage] was completed according to an offi[cial] plan. It proved entirely successful. The second stage viz., plant experimen[tation] stage should have to be gone through before the actual production was launched. Films, said Prof. Saha, were not only necessary for the film industry, they were also necessary in many other fields and that was why the scientists were particularly interested in it. In other countries industrial researches were mainly carried out by the companies themselves. He thought such types of work could not possibly be done in the University laboratories unless adequate funds were sanctioned to them for the specific works. The best course would be to do the work in the National Chemical Laboratory. As regards availability for research workers Prof. Saha thought that Universities could supply quite a number of clever and qualified boys who were capable of doing the work.

DEVELOPMENT OF AIR PHOTOGRAPHY

It is encouraging to learn that the technique of aerial photographic survey in India has been developed to a high degree of perfection. Aeroplanes, cameras, films and other survey apparatus have been improved enormously. New apparatus has been evolved and entirely new scientific methods adopted for compiling maps from air photographs. The Government of India are understood to be setting up modern photogrammetric equipment to enable the speeding up of [illegible] work on agriculture, engin[eering] [illegible] same will be [illegible] Calcutta, [illegible] Dun and Bangalore. [illegible] stand the Government of India's survey work is at present being undertaken by the Air Survey Company of India, which was set up in India in 1927 and is associated with the Air Survey Company of London. Project work in hand will be continued by the Company during this year and new commitments undertaken in the advice of the Priority Committee. As the demand for topographical and project surveys far exceeded the resources of the Survey of India, the priorities of different demands were determined at a recent meeting of the interests concerned and only surveys of a very high [illegible] addition to the topographical survey for army, as many as 14 important surveys of various hydro-electric and irrigation projects were in progress. The Air Survey of India, has guaranteed a minimum of about 30,000 square miles of aerial survey and photographs, which is by no means a mean credit. Bombay, the gateway of India, is also expected to be aerially photographed by the Air Survey soon. Photograph units aerially surveyed the Keyna Electric Project on the India Government's behalf. The unit recently took a number of photographs from an altitude of 10,000 feet of Ahmedabad at the invitation of the Ahmedabad Municipality.

MACHINE TOOL FACTORY IN MYSORE

Preliminary work with regard to the starting of the Government of India's Rs. 20-crore machine tool factory at Jalahalli near Bangalore has already begun. A number of Swiss experts have been invited to assist in the work. The factory on completion is expected to be the biggest machine tool factory in India.

and may go into production [illegible] years. The Mysore Government [illegible] offered full facilities for the loca[illegible] the main factory at Jalahalli and the foundry at Bhadravati.

AID TO HANDLOOM INDUSTRY

With effect from 1st July 1950, the Government of India intend prohibiting textile mills and powerlooms from manufacturing certain varieties of textiles, so that the handloom industry can exploit such varieties with advantage. These varieties are dhotis with border exceeding ¼" and dhotis with borders having zari or muga or artificial silk yarn; checked lungies, gamchas, and chaddars; bed-covers and certain varieties of bed-sheets, counter-panes, table-cloths, and napkins: gauze; bandage and jaconet cloth; dusters and coarse cloth of plain weave. The [illegible] varieties referred [illegible] looms in their areas [illegible] vacuum being created [illegible] up due to short supplies [illegible] ties. The above action has been [illegible] by Government as an experimental measure in the first instance for a period of six months only. The Government of India had also decided to reserve the manufacture of coloured and check saris and honeycomb towels for the handloom industry, but orders prohibiting the manufacture of such items by mills and power-loom factories will be issued as soon as the Textile Commissioner is satisfied that sufficient progress in their manufacture on handlooms has been made to fill up the vacuum which will be caused by the proposed reservation.

FABRICATION OF ALUMINIUM WARES

The large number of basic commodities produced with aluminium and aluminium alloys is indicative of the case with which the metal and its alloys may be worked and shaped. Aluminium is adaptable to practically all of the metal working processes although, for the most efficient use of the metal, its characteristics and those of its alloys should be understood. Even then it should be remembered that metal working is an art rather than an exact sicence, and also it depends much on the skill and ingenuity of the metalworker and also the type of tools and equipment employed.

The various types of brakes and folders, turning machines, roll-forming equipment and crimping machines, groovers, beaders and seaming machines, burring machines, edgers, and wiring machines usually found in the well-equipped sheetmetal shop may be employed in forming and shaping aluminium and aluminium alloy sheet. The basic forming operation in practically all of these machines is the bend, and a knowledge of the bending characteristics of the different tempers of commercially pure aluminium and the aluminium alloys will prove invaluable in the selection of the proper materials and tempers.

STAMPING PROCESS

The stamping process is used in the production of a wide range of shaped sheet-metal products, such as camera cases and motion-picture reels, saucepans and covers, airplane-engine cowls and bus-body corners, portable-typewriter frames and lighting reflectors. These and other articles are formed from commercially pure aluminium and a number of the aluminium alloys in suitable dies on power-driven presses, although other metalworking machines may be required in their completion.

Since stampings are made with the metal cold, strain hardening will take place as the metal is worked. The temper of the blank, or starting material, must be soft enough to allow for this cold working, yet hard enough so that the finished part will be as strong as possible. In the case of commercially pure aluminium, 2S, and the nonheat-treatable alloys that are commonly used for stamping purposes, 3S and 52S, the tempers may range from the annealed temper where the deformation is unusually great, to the full-hard temper where only a limited amount of forming is required. With some of the more severe forming operations, an intermediate anneal may be necessary before the stamping can be completed.

Stampings are also produced from the heat-treatable alloys 17S, 53S and 61S. Occasionally, other heat-treatable alloys, such as 24S. Alclad 17S, and Alclad 24S. As in the case of commercially pure aluminium and the nonheat-treatable alloys, the more severe forming operations are done with the metal in the annealed condition, after which the stampings are heat treated and aged. Since the quenching the die, the knockout, the blankholder, and operation in solution heat treatment may cause the stampings to warp and necessitate straightening or restriking in the press, it is advisable to produce the stamping after solution heat treatment provided there is sufficient plasticity in this temper to permit forming. After stamping the heat-treated blanks, the stampings are merely aged. In the case of 17S alloy, the stamping must be made immediately after heat treatment if advantage is to be taken of the greater plasticity of the unaged material.

rial, since this alloy ages spontaneously at room temperature.

BLANKING PROCESS

The cutting of flat sections from sheet-metal stock for use in subsequent forming operations is called blanking. The sections may be cut on shears or in dies on power-driven presses. For some sheet-metal operations, the sheet suitably sheared or punched is used; while for other operations, the pieces cut from the sheet are employed. The part that is used is commonly called the blank.

The essential parts of a blanking press are the blanking tool, the die, the punch, and the stripper. Coiled or flat sheet is fed into the press mechanically and held in place between the die and stripper, a side of the stripper serving as a guide for the sheet. The punch then comes down into the sheet through a hole in the stripper to shear the blank, which in the type of press illustrated drops through the die into a container beneath the die. The punch, attached to a slide head operated between guides on the housing of the press, is actuated by means of a crank through a clutch and gearing from a motor-driven shaft. As it begins its upward stroke, the stripper prevents the sheet through which the punch has passed from clinging to the punch. At the top of the stroke, the sheet is fed into the press, and the cycle of operation is repeated.

In designing the dies for a blanking press, the walls of the opening in the die are tapered away from the cutting edge 3 to 5 deg, to permit the punched pieces to fall freely. Clearance should be provided between the punch and die in order to obtain smoothly sheared edges free from blurrs. In general, a clearance equal to one eighth the thickness of the sheet being punched will prove sufficient. For quantity production, tool steel usually is employed for [illegible] die, although in some [illegible] has proved satisfactory for the [illegible] This is especially true where the [illegible] employed for blanking thin-gauge [illegible]

Where the pieces being blanked are small, it is possible to blank more than one piece at a time in a multiple punch and die. It is also possible to combine the blanking operation with a subsequent stamping operation on a multiple press, as for example, in the manufacture of aluminum caps and seals.

DRAWING PROCESS

In the manufacture of shell-like stampings, such as saucepans, roasters, ice-cube trays, bottle caps and seals, and chair seats, the formation of the shell is commonly called drawing. In the fabrication of a saucepan the blank is cut from coiled sheet on either a blanking press or circle shears, depending on the quantity involved, and passed through felt lubricating rolls. It is then drawn into a conical shell in two operations. Any wrinkles remaining after the second drawing operation may be smoothed out either by spinning the shell over a chuck in a lathe or by pressing the shell in a power press in dies, which reduces the thickness of the metal only slightly without altering the general shape of the shell. The edges are next trimmed and beaded. This operation may take place on a spinning lathe or on a power press in a trimming and beading die. The shell is then polished after which the lips on each side of the pan are formed in a die on a power press, and the handle attached.

Like those for the first drawing operation, the tools are divided into four parts: the die, the knockout, the blankholder, and the punch. For limited production, [illegible] iron or mild steel may be used [illegible]

[illegible] although where a large [illegible] is involved, the die and punch generally are made of tool steel, hardened and ground.

In the first drawing operation, the blank is placed on the die in a power-driven press: the blankholder drops down on the blank and holds it tight against the die; and on the downward stroke of the punch, the metal is forced into the form of the die. On the upward stroke of the punch, the knockout loosens the shell in the die so that it may be removed by the operator of the press. The second operation is substantially the same, except that the starting material is the partially drawn shell from the first operation.

The punch in a draw press operates on the same principle as in a blanking press, although the length of its stroke must of necessity be greater. The blankholder is raised and lowered either by pneumatic or spring pressure in single-action presses or by a mechanical crank in doubleaction presses. The double-action press usually is employed for drawing large pieces and for the quantity production of smaller pieces.

As the diameter of the blank is reduced by drawing, there is a tendency for the metal to wrinkle in the side walls. This is particularly true if there is little or no tension on the metal as it is drawn. With the blankholder holding the outer edges of the blank against the die, the necessary tension is provided. Conversely, if too much tension is exerted, that is, if the blankholder holds the blank too tightly, the punch will tear the metal as it comes down upon it. Tearing will also occur if the edge of the die over which the metal is drawn is of too small a radius. This radius is generally two to four times the thickness of the metal being drawn, although other factors, such as the alloy and the shape of the shell, may make it necessary to increase or decrease the curvature.

The amount of reduction in the diameter of the blank or shell during each drawing operation must be taken into consideration, as it bears an important relation to the smoothness of the finished product and the depth of draw. As the metal is drawn, it is strain hardened, the amount of strain hardening depending upon its reduction in diameter. Obviously, then, when the diameter is reduced by a series of easy draws, a deeper drawn shell can be obtained without an intermediate anneal than when the shell is drawn in one operation. In general, the diameter of the blank should not be reduced more than 40 to 50 per cent. in the first drawing operation, not the diameter of the partially drawn shell more than 25 per cent. in subsequent drawing operations.

Drawing is always done with the stock well lubricated. For simple drawing operations, a light mineral oil may be used, but for deep drawing, a lubricant with considerable body, such as mutton tallow, is necessary.

SPINNING PROCESS

The spinning process is employed for shaping from sheetmetal blanks over a chuck rotating in a lathe, forms which are symmetrical with respect to a common axis. While the process is one of the oldest metalworking processes and for many years served as the most efficient means for making circular shells, the drawing process has replaced it to a great extent for quantity production work. Its use in recent years has been limited to the production of shapes which could not be drawn either because of their size or design, or where the quantity involved was not sufficient to justify the cost of forming dies.

The equipment used in spinning circular shells consists of a lathe, a chuck, and the proper forming tools. The chuck, shaped to the interior form of the article being produced, is attached to the headstock of the lathe. The sheet-metal blank is held by pressure against the chuck by means of a revolving follower centre carried in the tailstock of the lathe. As the chuck and blank rotate in the lathe, the blank is forced against the chuck by means of forming tools. A lever action is obtained on the tool, the handle of which is held under the right arm of the operator, by using a pin in the toolrest for a fulcrum. As the blank takes on the shape of the chuck, the fulcrum is moved nearer the work by changing the location of the pin in the toolrest. When the blank being spun is a disc, it may be found necessary to support the underside of the free edge with a hardwood stick to prevent the outer edge of the disc from ruffling. This practice is not required when a drawn shell is employed as the blank.

Commercially pure aluminium and some of the more ductile aluminium alloys may be formed into quite complicated circular shapes by spinning. In general, the harder the metal is at the start of the spinning operation, the more pronounced is the effect of strain hardening for this reason, commercially pure aluminium can be spun more easily than the aluminium alloys.

The spinning process has its advantages over some of the other forming processes in that the operator can feel the metal "flow" beneath his tool. With this condition existing, he is able to judge the rate at which the metal is hardening so that tearing and breaking seldom occur. For the majority of spun articles, the amount of hardening is not sufficient to necessitate an intermediate anneal, although for some [illegible] re-entrant forms it [illegible] to spin the article over [illegible] then another, just as in drawing [illegible] different dies are employed. [illegible] becomes necessary to anneal the [illegible] before completing the spinning operation, a torch may be played on the partially spun article while it is rotating in the lathe. The annealing temperature in such cases is determined by rubbing a pine stick on the metal at frequent intervals. The pine stick will leave a charred mark on the metal, when the annealing temperature has been reached.

Where various sizes of shells are to be spun, a variable-speed lathe is desirable. The speed at which the lathe is operated is governed by the diameter of the chuck—the smaller chuck, the greater the rotary speed.

The chucks used for spinning may be made of hardwood, aluminium alloy, steel, or cast iron, depending on the number of pieces to be spun, their size, shape, and the finish desired. For quantity production, the metal chuck is preferred. It also proves more satisfactory where sharp re-entrant angles are present. Extremely large pieces are usually spun on wood chucks because of the greater cost of producing metal chucks.

The shape of the article that is to be spun determines the manner in which the chuck is made. If the shell is of a design which will permit it to be withdrawn from the chuck, a one-piece chuck is employed. On the other hand, if the chuck is partially enclosed in the shell as it is spun, as in the case of teakettles and coffeepots, a sectional or off-centre chuck is used.

Instead of using the sectional chuck or the off-centre chuck, it is quite possible to spin a circular shell "on air." In "spinning on air," a straight-sided shell [illegible] spun in the usual manner [illegible]

[illegible] the work was [illegible] up with [illegible] in place of the chuck, he [illegible] inside of the shell by means [illegible] hardwood wedge held in his left [illegible]. In some respects, spinning in this [illegible] can be likened to the moulding of [illegible] vessels.

Prior to spinning, the blanks should be lubricated. Beeswax, tallow, or lard oil mixed with white lead or vaseline, are quite suitable for small work; that is, where the diameter and thickness of the blank are comparatively small. As the size of the blank increases and greater pressure is required to from the article, ordinary soap will be found to be a more satisfactory lubricant.

In general, spun articles are formed and finished without removing them from the lathe. In this respect, the spinning process differs from many of the other metal-working processes. Spinning is also used as an adjunct to some of the metalworking processes. In recent years, drawing has replaced spinning for many types of circular shells, since it is more economical for quantity production work. However, many articles initially drawn must be finished by spinning, as in forming the necks on coffeepots and teakettles. Again, the wrinkles in drawn shells may be smoothed out by spinning while spinnlng is employed to trim and bead the edges of many shapes. The spinning blank, therefore, may be either a sheet-metal disc or a drawn shell.

When [illegible] of a particular shape are [illegible]. It would be [illegible] economical to design and construct presses or spinning equipment for their production. Again, the pieces may be of a design which cannot be made readily by either drawing or spinning. In such instances, they are formed by beating or hammering the sheet. The hammering may take place over a wood form with the sheet clamped to the form. As forming progresses, additional clamps are employed until the beaten sheet covers the entire form and assumes its shape. Either pneumatic hammers or wooden mallets are used for beating, depending on the size of the section.

The skilled craftsman may eliminate the form entirely and employ a leather bag filled with sand or metal anvils of the proper curvature on which to hammer the sheet to shape. Templates are used to check the work and determine whether the desired form has been obtained.

An open-frame, power-driven hammer, operating in much the same manner as a steam or air forging hammer, may also be used for shaping sheet and plate. The anvil portion of the machine, as well as the mechanically driven hammer, is curved slightly so that when the hammer hits the sheet on the anvil the sheet will curve. The pressure exerted on the sheet and the position in which the sheet is placed on the anvil make it possible to obtain many diversified forms. The operator gauges the shape of the formed article by the use of suitable templates.

—BLEACHING OF WOOL

IT is a well-known *fact* that scoured wool is not perfectly white but possesses a cream or slightly yellow colour. This is due to the presence of certain pigments which have not, as yet, been isolated or identified.

Although the proportion of wool, which is bleached is very much lower than that of cotton yet a considerable quantity of well bleached wool is consumed in some special classes of fabrics, such as knitted goods for ladies' underwear, white yarn for knitting purpose, and wool to be dyed in the fashionable pastel shades which need to be bright and clear.

It is preferable to bleach the material beforehand or the results will be rather yellow and "saddened".

Bleaching, therefore plays an important part in the purification of wool and is not a logical extension of the scouring process. The two chief methods of bleaching wool are with :

(a) Sulphur dioxide.

(b) Hydrogen peroxide.

When woollen goods are to be bleached, they should be on the alkaline side of neutrality; "unshrinkable" hosiery, carbonised material and acid-milled wool may therefore need special attention beforehand.

BLEACHING WITH SULPHUR DIOXIDE

The simplest method of bleaching wool with sulphur dioxide is to expose the scoured material in the wet state to the action of sulphur dioxide gas; a variation of this process is to bleach the wool by dipping in a solution of sulphur dioxide or sodium bisulphite.

STOVING METHOD

The classical method of bleaching wool by stoving figures amongst the interesting illustrations which are to be found on the walls of Pompeii, the material was spread over a frame beneath which sulphur was burned in a small pot. The modern process is not vastly different, for it is customary to suspend the wet material, after scouring and squeezing over poles or rods in a closed chamber where it is exposed to the fumes of burning sulphur. The absence of metal is necessary, and the stove is made of wood, brick or stone; the wool is exposed for 4 to 12 hours and it is usual to conduct the process at night. About 6 to 7 lbs of sulphur are required per 100 lbs of wool.

In the simplest form, a series of parallel wooden poles is evenly spaced about 8 inches apart and at such a height that the operative may hang the wet fabric from them in loops or fastoons; the walls of the room are generally boarded, and small vertical flue projects through the roof to ensure a very moderate circulation of air, for otherwise the burning of the sulphur would cease prematurely.

In one corner of the floor is placed a small iron tray or pot containing the sulphur which is ignited by dropping on to it a red-hot piece of iron; the door of the chamber is closed, and the burning sulphur generates sulphur dioxide which fills the chamber and is absorbed by the wet fabric.

On account of the fabric being wet, the surrounding atmosphere becomes humid, but during the night the temperature falls and some moisture is apt to condense, dropping on to the wool and causing stains. It is possible to obviate this by placing a fabric shield between the roof and the poles on which the cloth is suspended; there is some evidence of

[illegible] ... [illegible] ... is due to sulphuric acid or not.

Another defect of the simplest method of stoving wool is that the burning sulphur may become so hot that some vaporisation takes place and particles of sulphur finally deposit themselves on the wool; for this reason, an alternative method of stoving is to burn the sulphur in an ante-chamber and circulate it through the main chamber by a fan.

These somewhat crude methods are still widely utilised in spite of their disadvantages. The fumes have to be disposed of and are apt to be objectionable; sulphur trioxide formation is apt to affect dyeing properties.

The stationary mehod of stoving wool may be the oldest, cheapest and simplest bleaching process, but it is by no means foolproof; the amount of moisture in the wool needs careful control for if it is excessive then it tends to accumulate at the bottom of the material with irregular results. On the other hand, when the cloth is not sufficiently damp, the bleaching action is diminished. On this account, the "running" stove offers an alternative to the "hanging" stove; the cloth is passed through the apparatus by means of a series of rollers and then allowed to remain on batch-rollers overnight. A second passage through the stove completes the process, after which the goods are washed as usual. In some cases the sulphur dioxide is generated in a separate burner and forced into the stove by fans. In general, however, the bleaching effect is less pronounced than from the "hanging" stove.

The avidity with which wool retains sulphur dioxide is such that it is very difficult to rid the bleached material of the unpleasant odour; in spite of very thorough washing it is not possible com-[illegible] ... dioxide and it is often necessary to give a second chemical treatment to remove the sulphurous residue. As might be expected, oxidising agents form the chief reagents for this purpose, and dilute solutions of calcium or sodium hypochlorite may be used especially with fabrics intended for printing; the hypochlorites not only remove the sulphurous acid by converting it into sulphuric acid, which is more readily removed by washing, but they increase the affinity of the wool for dyestuffs.

SULPHITES METHOD

The liquid methods of bleaching with sulphur dioxide usually depend on the use of sulphurous acid, although it has been suggested to employ a two-stage process, first an impregnation with sodium bisulphite solution followed by acidification with sulphuric acid. It is more general to work the goods in a bath containing sodium bisulphite and either sulphuric or hydrochloric acid; the water should be free from iron.

The sodium bisulphite processes may be operated in the following manner: For a single-bath treatment, about 1 gallon of sodium bisulphite solution of 70°Tw. and 1 pint of sulphuric acid are required per 100 lbs. of wool; fabric may be treated for 2 hours or more on the jig, whereas yarns may be saturated and steeped for 2 to 3 hours. In both cases, it is wise to ensure good ventilation on account of the evolution of sulphur dioxide.

An alternative methtd is to steep the wool for 6 to 10 hours in 2°Tw. sodium bisulphite solution, squeeze, and then immerse in 1°Tw. sulphuric acid solution. Whatever method may be employed should be followed by a thorough rinsing afterwards.

The white obtained by the aqueous method is no more permanent than that from the gaseous method,but a better control may be exercised especially with piece goods. The bleaching action may take a little longer than with stoving, and is not quite as good.

DEFECTS OF SULPHUR DIOXIDE METHOD

The main disadvantage of this method is that the bleaching action is very slow and requires many hours for a good effect; double stoving produces a better white, but numerous repetitions of the process or very prolonged treatments do not bring about further improvements.

Some of the practical problems connected with the stoving of wool indicate that a slightly superior effect is obtained when the wool contains little soap or is slightly alkaline: wool previously treated with sulphuric acid is apt to give inferior results. In neither case is the premanency of the white affected. The concentration of sulphur dioxide in the stove should be as high as possible, but although the rate of bleaching increases with temperature, the quality of the white is not improved.

The wetness of the wool is an important factor in the stoving process and needs a little care; if the wool is too dry, the bleaching is poor, but if the goods are too wet there is a tendency for the water to accumulate in the bottoms of the loops of the fabric and give an irregular bleaching action throughout the piece. The latter defect is generally obviated in the "running stove" method.

The theoretical aspect of the sulphur bleach has attracted some notice, and it is most generally assumed that the action is one of reduction. It is well known that the sulphur dioxide bleaching of wool does not give a parmanent effect; the original brilliant white gradually disappears until the creamy yellow appearance is restored as is [illegible] skirts and trousers [illegible] phenomenon disposes of [illegible] that in the bleaching process [illegible] dioxide forms a soluble compound [illegible] the colouring matter.

BLEACHING WITH HYDROGEN [illegible]

Hydrogen peroxide gives a permanent bleaching effect on wool and is therefore used for the highest-quality material where whiteness is required; the use of peroxide has been facilitated by the commercial production of stable solutions of high concentration.

Two methods may be employed: (a) the steeping method in which the goods are immersed in H_2O_2 solution (0.5 to 5 volumes) either at room temperature or at 50°C. for from 1 to 24 hours according to conditions and the type of wool undergoing bleaching; (b) an ageing process in which the goods are impregnated in 1.5 to 10 vol. H_2O_2 and then dried at a temperature of 17 to 27°C. In both cases, the bleaching process is followed by thorough washing.

More drastic treatment is required for the very yellow cross-bred wools than for the less-coloured varieties, but in all cases it appears that a really goods white can only be obtained with some degradation of the wool itself: actually, hydrogen peroxide gives a pinkish-white which may be improved by a subsequent treatment with sulphur dioxide, either by stoving or bisulphite solution.

It has also been suggested that the pinkish colour of peroxide-bleached wool may be due to over-bleaching.

It is necessary to adopt similar precautions in using hydrogen peroxide on wool as with cotton in so far as the presence of metals is concerned; [illegible] steel or monel vessels are [illegible] wood is gradually [illegible]

[illegible] the surrounding wool.

With wool, sodium silicate is preferable to ammonia for neutralising the bleaching bath as it exerts a better stabilising action, although wool itself has an appreciable effect. An improved method for wool in which sodium pyrophosphate and sodium oxalate or oxalic acid is used; this agent is available commercially as Stabiliser C. The bleaching bath is made up to 1 or 2 vols. according to the degree of white required and 5.5 lbs. of Stabiliser C is added for every 100 gallons of the bath irrespective of the concentration of peroxide. Bleaching is carried out at 50°C., and not only is the necessary time of treatment less than with other Stabilisers, but the white is better and obviates the necessity for a further treatment with sulphur dioxide. This stabiliser not only neutralises the peroxide liquor but exerts a buffering action during the bleaching process.

With the silicate method, the peroxide is brought to pH7.2 to 7.4 using phenol red as indicator, and in these circumstances a steep for 12 to 15 hours is necessary in 1 vol. H_2O_2 solution at 50°C.; improvements may be made by adding more silicate, using phenolphthalein as indicator, or by employing a higher concentration of peroxide. With piece goods, it is sometimes convenient to work the material on a jig during the bleaching process, as this gives a more even result which may be necessary for material to be dyed subsequently; similarly, hosiery fabric may be treated on a wince machine. In these two cases, the time of treatment may be reduced on account of the more even treatment, and the greater possibility of maintaining a uniform temperature.

Heavy piece goods such as worsteds [illegible] may need 6 to 12 vol. [illegible]

Blankets are generally bleached in [illegible] H_2O_2 and again are thoroughly impregnated, batched and allowed to stand for 24 hours or so; if the blankets are dried on frames or stenters, then the drying and bleaching may be arranged to take place simultaneously.

Where the ageing mehods at room temperatures are used, it may be advisable to employ a solution of pH9 to 10 on account of the lower temperature.

The strength of the bleaching bath may be followed by titration with potassium permanganate or by the iodine method; the peroxide bleach permits of the baths being replenished from time to time.

Although it is possible to bleach wool at 40 to 50°C. in 1 to 2 vol. hydrogen peroxide solution at pH 9 in about 2 hours, the conditions of time and temperature are often varied to suit the convenience of the bleacher; hence a great deal of wool, previously scoured with soap, is allowed to bleach overnight. In these circumstances, the temperature of the liquor gradually decreases; peroxide [illegible] of 1.5 vol. concentration is often [illegible] the goods are entered at about 50°C. [illegible] temperature falls to about 35 or [illegible] the twelve hours. It will be noted that the so-called stagnant process is adopted, whereby the wool is immersed in the liquor and then neither the liquor nor the material is moved during the treatment; this is somewhat unusual in textile processing. Some relative motion is generally essential if a uniform action is to be obtained, but in this case, the wool is packed somewhat tightly into the liquor so that there is almost complete absorption which ensures an even [illegible] with a large excess of liquor the te[illegible]

cy would be for the outer surfaces of the woollen material to be bleached more than the rest of the goods, unless there was some movement of the liquor.

OXIDATION

The chemical reactions which take place during the bleaching of wool with hydrogen peroxide have received attention from Smith and Harris (supra), and they are of the [illegible] addition to the destructive action on the natural yellow colouring matter, [illegible] also some attack on the cystine or disulphide linkage of wool. In the extreme oxidation of the cystine linkage could produce sulphuric acid, but the bleaching action is so controlled that oxidation does not proceed to this extent.

[illegible]

[illegible] ion of the body with lice [illegible] is an annoying and unpleasant condi- [illegible]. [illegible]ly speaking the itching and discomfort is the chief difficulty present- [illegible]. Sometimes, secondary infection may take place, and in a few cases body lice may transmit disease from one individual to another as in the case of typhus.

DIFFERENT TYPES

There are three different types of louse infestation: pediculosis capitis, pediculosis corporis and pediculosis pubis. The first is a condition wherein the hair of the scalp and sometimes the beard is infested with the louse pediculus capitis. It is more common in females than males since in the former the hair is longer. Children are frequent- ly infested as a result of their close con- tact with one another in schools and at play. Diagnosis is easily made by the presence of pediculi (lice) and their characteristic ova (nits). The lice are gray in colour and are found chiefly be- hind the ears and on the back of the head. The itching caused by the lice usually leads to scratching, and the scalp may be excoriated with exudation and crusts which mat the hair.

PEDICULOSIS CORPORIS

Pediculosis corporis or body lice in- festation is due to pediculus corporis. These are larger than head lice. They are usually found in the clothing, especi- ally the underclothing, except when feeding. Intense itching particularly in body areas near the seams of the under- [illegible] is the chief symptom. The bites, [illegible] usually produce a papule with [illegible] usually radiating from it. [illegible] authority attributes the papule to [illegible] to the faces deposited as the [illegible]

Constitutional disturbances may ac- company the bites during the early stages and secondary infection may occur later.

PEDICULOSIS PUBIS

Pediculosis pubis is an infestation of the public hair and sometimes other areas covered with short stiff hair, such as the eyebrows and in the axillae. It is caused by the louse pediculus pubis, commonly called the crab louse. These are less active and are usually found attached to the base of the hair. Itching and scratching of the infested regions are the chief aymptoms, although there may be dermatitis from prolonged self-treat- ment with an ineffective pediculicide. In some cases bluish spots appear on the abdomen, caused by the toxin secreted by the parasite.

THERAPY

The primary objective in the treat- ment of the pediculosis is the eradication of the pediculi and their ova. In some persistent cases shaving of the infested area may be necessary in addition to the usual treatment. In the case of body lice, dusting the under clothing with powder- ed DDT (10%) will control the in- festation rapidly, since it is highly toxic to the adult forms. It is very important to fumigate or treat with a strong anti- septic or DDT, all bedding, clothing and personal articles which may be in- fested with lice or ova.

The treatment of pediculosis capitis or pubis is now a relatively simple mea- sure since there are a number of very effective pediculicides available. For many years Larkspur Lotion was very widely used but this preparation is not as effective as many other agents and there is some hazard in its toxicity.

Larkspur (Delphinium) contains a number of toxic alkaloids including ajocine and ajaconine which are toxic to the pediculi. However, when absorbed through the skin there is always the possibility of a toxic reaction on the part of the infected person. Mild Mercurial ointment (Blue ointment) was at one time widely used, particularly for pediculosis pubis, but this has been largely replaced by more popular products. Powdered Derris root or other powders containing rotenone have been used as have ointments containing pyrethin. Vinegar containing 1 in 1000 mercuric chloride has also been recommended.

In recent years some newer products have been developed. Here a good number of recipes reproduced from PHARMACY INTERNATIONAL have been given for benefit of readers. These employ pediculicidal chemicals such as benzyl benzoate, DDT and thiocyanates.

BENZYL BENZOATE LOTION

Benzyl benzoate	250	c.c.
Triethanolamine	5	Gm.
Oleic acid	20	Gm.
Water	750	c.c.
To make about	1000	c.c.

Mix the triethanolamine with the oleic acid, add the benzyl benzoate and mix well. Transfer the mixture to a suitable container of about 2000 c.c. capacity, add 250 c.c. of water and shake thoroughly. Finally, add the remainder of the water and shake thoroughly.

This lotion is applied to affected areas and allowed to dry. It is removed after several hours by washing thoroughly with a mild soap and water. It should not be allowed to get into the eyes, open cuts or wounds. After its use, comb the hair to remove dead lice and nits.

This same lotion is [illegible] agent against scabies. For this [illegible] condition it is applied with a brush over the entire body, following a hot bath and is allowed to dry. It was widely used during the war in treating scabies in the armed forces.

NBIN EMULSION

DDT	6	Gm.
Ethyl aminobenzoate	12	Gm.
Benzyl benzoate	68	Gm.
Tween 80*	14	Gm.

This is diluted 1:5 with water, shaken to give an emulsion and applied as described above. It is claimed to be 100 percent effective.

Two other simple, but effective, lotions are:

I

Phenyl cellosolve**	20-40	parts
Alcohol to make	100	,,

II.

Xylol	25	parts
Liquid petrolatum	75	,,

These lotions are applied to the affected areas and then removed in a few hours by thorough washing.

A powder that has proven effective is made as follows:—

NCI POWDER

Powdered naphthalene	96	parts
Creosote	2	,,
Iodoform	2	,,

*Tweens are polyoxyalkalene derivatives of partial fatty acid esters of hextans and hexides. They are sold by Atlas Powder Company of Wilmington, Del., U.S.A.

**Phenyl cellosolve may be had of Carbide & Carbon Chemicals Corporation, New York, N.Y.

WOOD FOR THE SPORTING GOODS

For the manufacture of a large number of sporting goods wood is the principal requisite but not all wood is suitable for all purposes. A particular wood is, however, useful for each class of sporting articles. Formerly, it was believed that Indian woods were not suitable for these purposes. But with the expansion of knowledge this erroneous belief is completely removed and many varieties of wood are found to be the best substitute of their kindred foreign varieties.

In this article it is proposed to discuss some of the useful types of wood which can be profitably utilised in the manufacture of a large number of sporting goods possessing superior properties to those of foreign made articles. These useful hints have been summarised from H. Trotter's Manual of Indian Forest Utilization for those who are on the lookout of starting this daily expanding line.

BILLIARD CUES

The shafts of billiard cues are usually made of European ash (Fraxinus species) of maple (Acer species), but there are several Indian woods which are quite suitable for the work.

The important points to remember about a billiard cue wood are that it must be of the right weight, and must have a long-fibred straight grain. The wood must be white or nearly so, and must be free from defects such as small knots or flecks. The weight required is about 42 lbs. per cu. ft. Strength is not very important but freedom from warping is essential.

The three timbers which are found most suitable are Diospyros melanoxylon, Grewia tiliaefolia, and Polyalthia fragrans.

CRICKET BATS

The best and only cricket bat wood used is willow (Salix Spp.) and no other species has yet been found suitable for this purpose. The Kashmir willow from which cricket bats are made in India is a hybrid species, Salix alba X fragilis. Attempts have been made to find substitute wood in India, but without success and attention has now been turned to planting suitable willow species in hill districts.

CROQUET BALLS AND MALLETS

For croquet balls and mallets the only wood found suitable is Buxus Sempervirens (box). The two essentials are weight and closeness of texture, and Olea ferruginea might, therefore, make a good substitute for box for this purpose, as it is one of the heaviest Indian woods and has, in addition, an extremely close texture.

HOCKEY STICKS

Hockey sticks in Western countries are made of ash (Fraxinus excelsior and others), and most of the sticks imported into India will be found to be made of this wood.

In India, ash is not very common. It is true that Fraxinus excelsior grows in India, and that the country possesses other representatives of the family in Fraxinus Floribunda and Fraxinus Micrantha, but none is really common, and they only grow at high elevations which make their extraction both difficult and expensive. Substitutes have therefore been sought, and mulberry (Morus alba) has been found extremely suitable for the purpose, and is now used as the chief hockey-stick wood in India. The mulbery hockey sticks have been exported

in large quantities to Europe and elsewhere, and the opinion is growing that Indian mulberry makes a better stick than ash, other woods such as sissoo (Dulbergia sissoo) are also employed for the purpose, but this is due to their being common timbers in the North India, where the chief centres of manufacture are situated Hockey sticks are usually steam bent, and besides having the necessary qualities of toughness, hardiness, and elasticity must be made of a wood with straight grain which will stand up to the process of bending without cracking and splitting.

Mulberry has proved to be an excellent wood for steam and has all the qualities demanded Celtis australis from Kashmir is another wood used for hockey sticks in Northern India.

TENNIS RACQUETS

In Western countries, the frames of tennis racquets are usually made of ash and this timber has been used with success in India, but, as already mentioned, ash is not very common or easily available in this country and substitutes have to be sought.

Dalbergia sissoo (Sissoo), Juglans regia (Walnut), and Morus alba (mulberry) have all been used with success, the last named being especially popular for frames, while the other two are employed for the wedge and handle pieces. It must be remembered that tennis racquet frames have to be steam-bent, and a long-fibred and straight grained wood is therefore essential Morus alba fulfils both essentials. Many other woods may be used for the wedge and handle parts: Cedrela tooma, Swetenia mahogani, Swfetenia macrophylla, and Melia azedarach being amongst the best for the purpose.

For many [illegible] turers have been [illegible] tute for hickory [illegible] club shafts, but to date [illegible] been satisfactorily found [illegible] steel shaft which is now [illegible] lar. Hickory is a native of [illegible] rica, and possesses certain [illegible] which are difficult to find amongst [illegible] woods. The chief of these are [illegible] strength, combined with toughness [illegible] elasticity. Other timbers, such as [illegible] can be found which approach hickory in some respects, but none of them come up to it in all qualities combined. Several Indian woods have been tried for this purpose and a few woods are found to approach hickory very closely, and in any case make perfectly good shafts for the average player.

Of these, Terminalia manii (black chuglam), Sageraea elliptica (Chooi), Growia species, Anogiessus species, and Lagertroemia hypoleuca (Jarul) are the best, and have all been tried and tested by experienced players and have been in use for many years without deterioration. For golf club heads. Xylia dolabriformis (Pyinkado), Mesua ferrea (Mesua), Acacia arabica (Babul); and Carapa moluccensis (Pussur), have all been found suitable.

GUNS AND RIFLES

The wood used for gun and [illegible] parts must be moderately hard, close-grained, perfectly sound, and of a weight of about 35 lbs. per cu. ft. but above all it must stand up to the high speed machines used in the manufacturing [illegible] and must not under any circumstances split, warp or move in service. This [illegible] consideration can only be achieved [illegible] perfect seasoning. Many [illegible] are available but walnut [illegible]

... changes of temperature and climate.

... the supplies of walnut in India are ... other woods as substitute for walnut were tried for army rifle work but the result was partially successful. But for cheaper types of guns and rifles timbers other than walnut are used with satisfaction. The most suitable woods for this purpose are: Adina cordifolia, Cordia myxa, Dalbergia latifolia, Dalbergia sissoo, Gmelina arborea, Lagerstroemia flos-reginae, Morus serrata, Pistacia integerrima, Taxus baccata, and Tectona grandis. Artocarpus hirsuta, Albizzia lebbek, and Pterocarpus marsupium would probably be better than any of the above.

FISHING RODS

The wood most commonly used for high class solid fishing rod is greenheart (Nectandra species), but this wood does not grow in India. Several substitutes have been tried in this country, and black chuglam (Terminalia manii) and chooi (Sageraea elliptica) proved good.

Bamboos are used on a large scale for fishing rods in India, the wellknown ringal (Arundineria falcata) being amongst the most popular. The so-called split cane rods are usually made of split bamboo. The bamboo now used for this ... exact species of this bamboo ... known.

LANCE AND SPEAR SHAFTS

Lance and spear shafts are ... made of bamboo, the solid male bamboo (Dendrocalamus strictus) being ... used for the purpose. Shafts have to be very carefully selected, and any bamboo showing a flaw or damage by borers or not coming up to standard in the matter of size is at once rejected. Those selected are then subjected to serve treatment in the matter of seasoning, straightening, and preparation generally for the purpose in view.

SKIS

Skis are a fairly modern importation into India and it is only a few years ago that ski-ing in this country was seriously considered.

The woods used in Western Countries are ash (Fraximus species) and hickory (Hicoria species). Indian ash (Fraximus floribunda) has been found suitable, but both Dalbergia Sisoo (Shisoo) and Anogeissus latifolia (axle-wood) were reported on as better than Indian ash by the Hony. Secretary of the Ski Club of India. Toughness, flexibility even texture, and straight grain are the essential features for a good ski wood.

—Storage of Groundnut [illegible]

GROUNDNUT kernels stored and exported from the Madras Ports are reported at destination to contain a very high percentage of free fatty acids.' It was *estimated at one time that* because of the poor quality, the Indian groundnut trade was losing annually to the extent of about six millions of rupees.

The deterioration of kernels is attributed to the unscientific method of decortication and storage practised by the exporters. Kernels stored especially in port godowns have been observed to deteriorate considerably in quality due to a variety of causes such as the condition of the material at the time of storing, type of bedding material used, nature of flooring, the height to which bags are piled up, etc. Kernels which are not properly dried were said to develop free fatty acids within a short period and at the same time to cake up during storage. Damage due to rise of dampness from the floor during rainy seasons is also estimated to be considerable.

Under the scheme of research on the storage of groundnuts run for a period of four years, from 1943 to 1947, with the co-operation of the Indian Council of Agricultural Research, the *various problems* connected with the storage of groundnuts were investigated in detail. Representative lots of two important commercial grades of groundnuts, viz. Coromandel and Peanut were stored under actual godown conditions in the ports under different systems of storage obtaining at, and the progress of deterioration (i.e. development of free fatty acids, damaged kernels and incidence of insect pests) was studied. Investigation on the working of the groundnut decorticators was also carried out in order to suggest improvements in decorticating practices.

The following summarised from [illegible] FARMING are the important findings of the investigations, which will be of great use for those connected with the production and marketing of groundnuts.

In Madras groundnut is mostly raised as a rain-fed crop from July to December. It is also grown in a small scale in certain districts like South Arcot, North Arcot, Trichy, Coimbatore, etc. in summer months (February-July) under irrigated conditions. Groundnut kernels obtained from the crop raised in the summer season gave about 2 to 3 per cent. more oil than that raised during the rain-fed season. But the increase in free fatty acids and insect attack was much more in the summer produce than in the winter produce. The loss of material at the end of 10 months of storage amounted in the case of the summer produce to 17¼ lbs per bag of 177 lbs. while the loss was 15½ lbs. in the case of the winter produce.

Even though it is generally admitted that all produce intended for storage should be well-dried, it is not uncommon to store partially dried material. Studies in storage conducted showed that the moisture content of the produce at the time of actual storage was the most important predisposing factor for deterioration of groundnuts. The kernels with a moisture content of seven to eight per cent (or a shrinkage of 2 to 3 per cent) developed of storage; the kernels of the bottom bags appeared fire-fanged and caked up at the end of 10 months of storage. The free fatty acid content was also very high. The condition of fully dried kernels, containing 5 per cent of moisture, was comparatively better at the end of storage. The loss of material due to drying and insect attack in the [illegible]

[illegible] was as high as [illegible] lbs. per bag of 177 lbs. in the Coromandel variety and [illegible] lbs. in Peanut, while it was only [illegible] lbs. and 12 lbs. respectively in well dried kernels.

Some sort of bedding material is invariably used at the time of stacking groundnut bags whether the floor is pacca or kacha. Sand covered over with gunny cloth, railway cinders, groundnut shell and coir matting over cement floor are some of the bedding materials in general use. The investigation on deterioration of groundnut kernels stored on the different bedding materials showed that hard bedding materials like coir matting on hard floor and railway cinders were rather unsuitable for the purpose; caking up of kernels and damage to gunnies of the bottom layer of bags were always more pronounced in these cases. Further insect pests were seen to breed in larger number in the bedding of coir matting and groundnut shell. All considered sand covered with gunny appeared to be the best dunnage material for stacking groundnut kernels paced in gunny bags.

The caking up of kernels and the damage to gunnies of the bottom bags were found to be almost proportionate to the height of stacking. The damage is appreciable when the bags are piled upto a height of more than 10 bags, particularly when the stacking is done on hard bedding materials like coir matting on hard floor and railway cinders.

Large scale storge in port godowns is confined to kernels only. During decortication and shelling of pods either by hand or by machine, large quantities of kernels get split or broken into small fragments. The extent of breakage is influenced by the moisture content, the type of decorticator used and the care and [illegible]

[illegible] The study of the deterioration of kernels under storage showed that deterioration was directly proportional to the extent of the broken components in the produce. When these broken and split kernels were present to the extent of 75 per cent, the loss due to driage and insect attack was as high as 20 lbs. at the end of 10 months' storage for every bag of 177 lbs. stored; it was only 9 lbs. in the produce composed of whole kernels only. Split and broken kernels were found to deteriorate more rapidly in storage than the whole kernels.

The efficiency of containers such as gunny bags, basket bins and mud bins for the storage of groundnuts both as pods and kernels was investigated as also loose storage without containers. Storage in the form of pods, served to reduce deterioration and loss to an appreciable extent. Among the containers mud bins appeared better for kernels. However, the practibility of their adoption in large scale storage is very limited.

For machine decortication Kirloskar's "Kalyan," Dandekar's "Sangli" and "P.S.G." are the important makes found in general use. An investigation into their working showed that the first one was superior to the other two because of the fact that it gave higher outturn per hour and breakage of kernels was low. Certain glaring in the working of decorticators were noted such as working the decorticator at high speed, unregulated feeding of groundnut pods into the machine, use of improper size of sieve and want of timely replacement of worn out parts. These should be remedied if the quality of kernels turned out by them is to be substantially improved.

The deterioration of kernels stored in gunny bags in well ventilated and periodically cleansed godown was also investi-

gated, particularly in regard to the incidence and spread of pests. It was found that to be really effective, such measures should be followed by all godown owners in a locality for the insect pests were found to migrate from one godown to the other.

It may be seen that the above observations made during the progress of the storage experiments are of considerable practical importance. The following suggestions are made regarding the steps and precautions to be taken by the producers and dealers of groundnuts in order to improve the quality of groundnuts marketed.

1. The groundnut crop should be harvested only when the crop is fully mature. Early harvest will result in a high percentage of shivelled kernels and free fatty acids and relatively low in oil content.

2. The produce should be dried thoroughly soon after harvest. All produce intended for storage should be well dried and should not contain more than 5 per cent. moisture.

3. As far as possible groundnuts should be stored as pods (nuts in shell) rather than as kernels even though more rooms will be required, for storing pods.

4. If groundnuts are to be stored as kernels, care should be taken to get them decorticated properly so as to reduce the proportion of split and broken kernels in the decorticated material. It is also desirable to reduce the period of storage of kernels as far as possible.

5. [illegible] hard [illegible] of [illegible] and piling bags too high [illegible] ed to minimise caking [illegible] damage to the gunny bags. [illegible] layers should be the optimum. [illegible] the different dunnage materials [illegible] used by the trade dry sand to a depth of about a foot and covered over [illegible] gunny cloth appears to be the best.

6. The produce of the summer crop should not be stored for long periods as it has been found to deteriorate faster than produce from the winter crop.

7. All godowns where groundnuts are to be stored should be *pucca* with smooth plastered walls and rounded corners and should be rat-proof. The godown including dunnage materials should be cleaned and disinfected by fumigation before storage. It is also desirable to clean the godown periodically.

8. Containers such as gunny bags, bins, etc., should be cleaned before hand and should be free from all pests. For storing small quantities of groundnuts in villages and bins appear to be the most suitable.

9. Among the groundnut decorticators in use, the "grate type" is the most suitable as the percentage of split and broken kernels is less in comparison with other types of decorticators. Regulation of the speed of working and proper adjustment of the machine will reduce the percentage of the split and broken kernels in the decorticated produce.

[illegible] by the weathering [illegible] decomposition of rocks assisted by [illegible] of plant life. Variations of [illegible] also have an important effect on the formation of soils, for rocks expand [illegible] heat and contract with cold.

Soils are either sedentary, that is, formed out of the under lying rocks, or transported, that is, formed out of the disintegrated parts of rocks, brought down mainly by the action of rivers from a distance. An admixture of large-sized stones in the soil is generally not desirable, as they interfere with proper aeration of soil, germination of seed and penetration of roots. The agriculturist should not only have an idea of the composition of his soil and of the stones which are found in the soil, but also of the sub-soil or the soil immediately below the surface soil interpenetrated with the roots of deeprooted plants. By this means he will be able to understand what plant-food there is, and how much of it will be available for a certain crop. A soil may be very fertile but the fertility may be very quickly exhausted. Chemical analysis and test is therefore a guide for ascertaining the value of rocks and soils, as the farmer has it in his power to utilise that value slowly or quickly according to his needs by the judicious application of tillage and by manuring.

CONSTITUENTS OF SOILS

The five main substances of which soils may be said to be composed are: [illegible] clay, lime, vegetable matter or [illegible] and stones.

SAND

[illegible] is principally composed of [illegible] or silica. It imparts a loose [illegible] to the soil, assists air [illegible] their way through the land, and aids the roots of plants in their efforts to penetrate in all directions. In agricultural and horticultural practices, sand is frequently added to the soil to render it porous.

CLAY

Clay is composed of two chemical bodies, known as silica and alumina, in combination with water. When wet, it is sticky and plastic, but when burnt, it loses its plastic property and becomes brittle. Liming also has this effect on clay soil, depriving it of its adhesive, binding nature and rendering its constituents fit for plant food. There are various kinds of clay, some being white, from which chinaware is made; others yellow, from which are made bricks, pots and other earthenware articles. Clay is colder, and retains much more moisture than sand. A certain proportion of clay is a desirable constituent in all soils and no land can be efficiently and economically worked unless clay is present to an appreciable extent.

LIME

Lime usually occurs in soils combined with carbonic acid as a carbonate of lime in various forms as chalk, limestone, and coral.

HUMUS

Humus or vegetable mould is formed by decaying vegetable matter, such as leaves, roots, stems, etc. and exists to some extent in all cultivated soils as a dark brown substance. It often occurs in abundantly on the surface of the ground in forests. Humus may be said to be the most important constituent of all soils for the planter or gardener. It has a great influence on the capacity of soils for retaining moisture, renders their cultivation

easier and encourages the activity of soil bacteria. Soils deficient in humus are liable to cake and become very hard in dry weather, and quickly lose their heat in cool weather.

LEAF MOULD

Leaf mould may be distinguished from humus by being composed almost entirely of decayed leaves; it is a valuable ingredient in composts for pot-plants, tender seedlings, etc.

STONES

Stones are simply particles of the original rock from which the soil was formed. If they do not exist in too great a number they solve a useful purpose in the soil, as they render it lighter in character, *affording porosity and assisting in the* retention of moisture.

CLASSIFICATION OF SOILS

Soils are classified according to their chemical and physical properties and are divided into classes, and sub-classes in accordance with the proportion of clay sand, lime, and humus they contain.

CLAY SOILS

Clay soils contain more than 50 per cent of clay. They are heavy and dense, very retentive of water, are cold and difficult to work, and require to be well drained in order to be properly cultivated. At the time of drought, plants on clay soils are liable to suffer, as the roots are unable to penetrate deeply into the stuff clays or draw water from the subsoil. Though such soils may contain an abundance of mineral food for plants, it is sometimes rendered unavailable by their stiff texture. This may, however, be corrected by judicious incorporation of sand, lime or suitable manures, and by irrigation. Clay soils of moderate texture have, nevertheless, very important advantages in the tropics, owing to their power of [illegible] moisture.

LOAMY SOILS

Loamy soils contain 30 to 50 per cent of clay, under 5 per cent. of lime, and the remainder of vegetable mould and sand.

SANDY SOILS

Sandy soils contain not less than 70 per cent of quartz sand, have little cohesion, are very porous, and contain little nourishment for plants. Such soils can be improved by the addition of clay, chalk or marl.

SANDY LOAMS

Sandy loams contain 20 to 30 per cent of clay, and may be with or without lime.

LOAMY SANDS

These comprise 10 to 20 per cent of clay; lime may be present or absent.

CALCAREOUS SOILS

These contain over 20 per cent of lime, and may partake of the characters of a loamy soil with 30 per cent of clay, or sandy soil with over 70 per cent of sand.

GRAVELLY SOIL

This is a term applied when a considerable amount of gravel or stones is present; such soil may also partake of the characters of the sandy, clayey, or calcareous classes.

MARLY SOILS

Marly soils contain from 5 to 20 per cent of lime, and may partake of the characters of the clayey, sandy loams, and loamy soils.

VEGETABLE MOULD

This term is applied to soils which contain not less than 5 per cent of humus or vegetable matter; they [illegible]

[illegible] and in dry localities it is [illegible] shallow.

PEAT OR BLACK SOIL

Peat or black soil is formed by the decay of marsh plants and mosses. Peat soils are not adapted for cultivation in their natural condition, although they are the favourite resort of certain plants. To render peat-bogs fertile, the excess of water must be drained off, and lime and sand added. The effect of this treatment is to aerate the soil, destroy the injurious acids present and prevent the accumulation of water.

HEAVY AND LIGHT SOILS

Although sandy soils are heavier than clay ones, agriculturists and horticulturists call a clay soil "heavy", and a sandy soil "light". These terms, however, refer to the facility with which the soils are worked, and not to their relative weight.

COLD OR WARM SOILS

Clay soils retain much more moisture than sandy soils, and this causes a great difference in regard to their temperature. The former are therefore sometimes spoken of as cold, and sandy soils as warm. As a certain amount of warmth in the soil is necessary for plant-life, this indicates the importance of draining low-lying, cold, clayey land.

SURFACE-SOIL AND SUB-SOIL

These are convenient terms, the former indicating the top layer of soil, which is usually distinct by its darker colour (owing to the presence of humus) and looser texture than that underneath, i.e., the subsoil. The latter, though usually more compact and of a lighter colour, varies considerably in character. It may consist mainly of sand, or of gravel or [illegible], or even resemble the surface-soil. The surface-soil varies in thickness according to locality and surrounding in[illegible]

CHEMICAL COMPOSITION OF SOILS

All soils are usually composed of organic and inorganic matters. The former comprise hydrogen, oxygen, nitrogen and carbon, which evolve as vapour when an animal or vegetable body is burnt in the air. The first three are gases, and the last is a substance, one form of which, charcoal, is familiar to every one. Besides these, there are two other substances, namely, sulphur and phosphorus, which are sometimes called secondary organic elements. The inorganic matters, which are always to be found in combination with other elements in lands suitable for cultivation, are potassium, sodium, magnesium, calcium, and iron. With the exception of magnesium, calcium, and iron, all these are essential constituents of plant food.

TESTING OF SOILS

To ascertain approximately the composition of a given soil: Weigh out [illegible] lb. of earth after it has been well dried, boil it for a short time in a pint of water, and then pour all into a glass vessel. Into this insert a piece of blue litmus paper; if the paper turns to a red colour, it shows that acid humus is present in the soil, and that lime is necessary to counteract the acidity. Then add more water, stir well, and pour off carefully the muddy water into a large vessel, care being taken that none of the sand which settles to the bottom is lost; stir up the sand with fresh water, which is again poured off into the larger vessel. This is to be done several times until the sand becomes clean and free from mud. The contents of the larger vessel are to be allowed to remain for several hours until the fine mud settl-

es to the bottom, when the clear [illegible] to be carefully poured off. The [illegible] the mud should then be dried and weighed separately, when, by comparing their bulk or weight, the proportion of sand and earthy matter in the soil can be ascertained.

To ascertain the presence or absence of lime in a soil. Besides the blue litmus paper test for lime, as already described, the presence of lime may be ascertained thus: Take some 10 or 20 small samples from different parts of the ground, mix them well together; then place a small sample in a tumbler and pour on it a wine-glassful of muriatic (hydrochloric) acid. If the liquid fizzes and bubbles freely, the soil may be considered to contain a sufficiency of chalk (carbonate of lime); but if it only effervesces feebly it is safe to conclude that a dressing of lime is desirable.

To ascertain proportion of humus in the soil, heat for an hour to a red-heat a given weight of thoroughly dry earth in an iron or clay vessel; the soil rapidly blackens if much humus is present, and then turns red or yellow, the vegetable matter being burnt off, when cool, weigh the earth again, and the loss in weight will give the proportion of humus in the soil.

Capacity of soils for holding moisture This is mainly dependent on the mechanical texture or poro- [illegible] fairly uniform [illegible] about 40 per cent. [illegible] the particles are [illegible] particles are a mixture of [illegible] (as gravel and sand), the [illegible] interspaces is much diminished. [illegible] other hand, if the [illegible] are porous, as in the case of [illegible] especially humus, the volume of the [illegible] spaces is much increased. It is [illegible] volume of interspaces that determines the amount of water which a soil will hold when perfectly saturated, or the amount of air which it will contain when dry. The influence of humus on the capacity of a soil for holding moisture is remarkable. Schubler found that after 72 hours exposure to moist air, humus had taken up nearly $2\frac{1}{2}$ times as much water as clay, and 40 times more than sand, which, under the same circumstances, took up [illegible] times less than clay.

A simple way of ascertaining the power of any soil to hold water: Fill a flower-pot nearly to the top with dry soil, and then weigh it (the weight of the pot, both wet and dry, must, of course, be known). Then gradually pour water on the soil until it begins to drop from the bottom. As soon as the dropping has ceased, weigh the whole; the difference in weight will approximately show the proportion of water held by the soil.

... most important documents ... been published lately and ... have far-reaching effects on ... and economic structure of the country is the Report of the Fiscal Commission.

It may be recalled that the Commission was appointed at the earliest opportunity by the Independent Government of India in April 1949, to recommend a fiscal policy for the adoption by the Government.

The Report makes a survey of the economic changes that have taken place since the Indian Fiscal Commission of 1922-23 reported and makes a number of recommendations, the important provision of which are:—

SHORT-TERM OBJECTIVES

The short term objectives envisaged by the Commission include: (1) Rationalisation of agriculture; (2) increase of concentration on basic and key industries and of those producing essential raw materials and consumer goods, like iron and steel, coal, cement, textiles, sugar and (3) a sustained drive for increased exports especially to dollar areas.

The Commission emphasises that no objective of economic policy that does not attempt to deal comprehensively with the chronic problems of unemployment and under-employment in the agricultural sector of the country's economy will achieve the basic purpose of raising the standard of living of the people. The fiscal policies must, therefore, be related to this ultimate end.

In this context, the Commission has stressed the need for the formulation of a ... population policy and ... of the ... of the people ... cost of ... progress. As a preliminary, it has recommended the constitution of a small expert committee to review the population data available to suggest what additional information should be collected to study the trends in population growth.

Recognising the basic significance of agriculture in a development policy for India the Commission has recommended:

(1) Rationalisation of agriculture—maximisation of production in terms of yield per acre by steadily improving agricultural methods and promoting an intensive system of mixed farming; and (2) drawing away the surplus forces from land into industries—occupations subsidiary to agriculture, cottage and small-scale industries, large-scale industries and tertiary occupations.

Urging for state initiative and assistance in the promotion of cottage and small scale industries, the Commission says: "In our view in each state there might be set up a statutory corporation aided by the State Government to be in charge of the measures which should be adopted for stimulating the growth of cottage and small scale industries."

Where there is no conflict between large-scale cottage and small-scale industries, the Commission recommends that the detailed investigation promised in the industrial policy statement should be pressed forward and a programme of action drawn up in consultation with the interests concerned. Where, however, large-scale industries compete with cottage and small-scale industries, it says the Government should safeguard the position of the latter after consultation with the interests affected.

In the opinion of the Commission, the pattern of industrialisation in India will follow broadly the lines of development in east continental Europe, China and Japan. On the assumption that there will be a planned policy in regard to the pattern of development of these industries the Commission has recommended orders of priorities for industries both in the public and private sectors.

ORDER OF PRIORITY

The order of priority for the public sector lists:

First, the essential defence industries: secondly, the Ministries connected with the development of natural resources like waterpower; thirdly, public utility industries like railway, electric power generation and fourthly heavy key and basic industries which in the absence of private enterprise the State may have to initiate and develop.

In the private sector the order is:

(1) The increase of production in existing undertakings upto the maximum of their installed capacity: (2) the expansion of existing industries upto the limits of effective demand in their market with special reference, wherever possible to export markets: (3) the establishment and development of industries which are complementary to existing industries in the public or the private sector like industries which manufacture the components of other industries or which carry the processes of production a stage nearer final consumption: (4) the establishment of such industries are related to existing industries and may increase the external economies resulting from the establishment of a group of connected industries and (5) the establishment of industries catering for a large market, internal and external, rather than those satisfying a limited or specific demand.

[illegible]

The Commission [illegible] against further concentration of [illegible] in areas which are already over-congested and advises the Government to improve the attractiveness of areas where from the social point of view it is proposed to encourage the migration of existing or new industries. The Commission further advises that the processes of decentralisation of large scale industries and the establishment of large-scale industries in rural areas should be encouraged.

On foreign trade policy, the Commission says that the country's short-term aim should be not merely to achieve equilibrium at an easily attainable level but to increase conditions in which current foreign exchange receipts are sufficient to pay for the volume of imports necessary to carry out production plants.

The long-term objects should be to direct these short-term developments, to promote a pattern of import trade by which India can obtain the foreign resources for the development of its agriculture, and cottage industry and to promote the pattern of export trade to enable India to pay for essential imports and enable the country to maintain its hold against competition from other countries.

The Commission has also indicated the extent of State help necessary for the development of agriculture, small-scale and large-scale industries. While in agriculture and small-scale industries, the State's activities relate to their improvement, in the large-scale industries the role of the State will be to arrange for such necessary supplies and services as cannot be obtained without State assistance and to ensure their equitable distribution so that production may be maximised and quality ensured.

[illegible] balance of payments problem. [illegible] the State may have to regulate the volume and composition of import trade in the interests of industrialisation.

The protection of industries, the Commission says, should be related to an over-all planning of economic development.

The Commission leaves the form and quantum of protection of basic and key industries to be decided by the tariff authority. For other industries, it lays down the criteria to be applied for granting protection, such as the economic advantage enjoyed by the industry, direct advantages, availability of raw materials, the ability of an industry to meet the domestic demand.

In cases where there is demand for an assurance of protection prior to the actual establishment of an industry, the Commission recommends that the tariff authority should examine the facts and estimates relating to the industry and advice the Government on the need for the protection of industries.

While recommending protection of agricultural products in the national interests, the Commission says that a programme of agricultural improvement must accompany the scheme of protection and form an integral part of it.

The Commission has suggested the creation of a development found by setting aside every year a portion of the revenue collections from protective tariffs for giving subsidies in lieu of or in addition to protective tariffs to industry. It also suggests a strong "after care" organisation to provide facilities necessary for rapid development of protected industries.

[illegible] (1) price policy, (2) [illegible] (3) quality of output, (4) [illegible] technological improvements, (5) provision of research facilities, (6) provision for the training of apprentices and high grades of labour, (7) prohibition of anti-social combinations or other objectionable activities and (8) the utilisation of domestic resources to the maximum extent possible consistent with quality.

The Commission recognises the tariff as a necessary and in some cases an important tool of industrialisation. It however takes the view that the force of competition and the efficiency of production in the highly industrialised countries of the world and the cheapness of modern means of transport have reduced the primacy of tariffs as an instrument of industrial development.

It has expressed general agreement with the view that foreign capital should be invited for projects in the public sector of the economy which depend on the import of capital goods and for undertakings in the private sector which involve new lines of production. It is of opinion that where indigenous industry is not likely to expand and meet the domestic demand, there should be nothing to prevent Government from inviting foreign capital on such terms and conditions as they may lay down.

"Dealing with problems of industrial management, the Commission recommends the setting up of a bureau of consultants whose services can be drawn upon by private industry on such terms and conditions as the Government may lay down. Among the safeguards recommended for the deficient administration of industries in the public sector are the periodic review of the Working of all Go[illegible]

ment undertakings by competent [illegible] and establishment of a consumers' council to be attached to each such undertaking and a tribunal on services and charges on the lines of the railway rates tribunal.

Having regard to the enlarged functions that will devolve on the future tariff-fixing authority, the Commission considers it essential that its status and efficiency should be raised by placing it on a statutory footing and providing it with a permanent and adequately staffed organisation. To this end, it recommends that the reconstituted tariff authority [illegible] standing machinery [illegible] present [illegible] have to perform [illegible] future the Tariff Board [illegible] as "the Tariff Commission."

Emphasising the need for [illegible] co-ordination of Government's [illegible] activities in promoting the [illegible] the country's fiscal policy, the Commission has suggested the constitution of a Board of Trade and Industry for closer administrative integration between the Ministries of Commerce and Industry.

PHARMACEUTICAL RECIPES

[illegible]

[illegible] protects the hands from [illegible].

[illegible] soap. fine shavings 1 ounce.

[illegible]	1	ounce.
[illegible]	1	"
[illegible]	45	minims.
[illegible]	1	ounce.

The soap is dissolved in the water heated for that purpose, the wax mixed in with much stirring, and, when all is in solution, the ammonia is added. When clear, the lanolin is put in, and then, if the mixture is very thick, water is added until the whole has the consistency of honey. Keep in a covered stoneware jar. The hands should be first washed with ordinary soap, and then, while the lather is still on them, a bit of the mixture about the size of a hazelnut is rubbed in until all is absorbed, and the hands are dry. At the close of the work, the film of wax is washed off in warm water and a little lanolin rubbed into the hand.

SKIN OINTMENT

Phenol	40	grains.
Boric acid	2	dr.
Oil of bergamot	30	mins.
Petrolatum	1	lb.
Colour with chlorophyll.		

Triturate the ingredients with the petrolatum in a mortar and put in pots.

TONIC TABLETS

Calcium hypophosphites	50	grains.
Manganese hypophosphites	25	"
Potassium hypophosphites	25	"
Iron hypophosphites	25	"
Quinine hypophosphites	12½	"
Strychnine	½	grain.
Potato starch, in powder	200	grains.
Sucrose, in powder, to make	350	"

Mix the hypophosphites of calcium, manganese and potassium with strychnine, and grind well together in a mortar. Dissolve the iron hypophosphite in a little water, granulate the mixed powders with the solution, and dry the granules. Powder the dried granules, and pass together with the starch, through a sieve, and make up to the required weight with sucrose. Make into 100 sugar-coated tablets.

COUGH DROPS

[illegible]	10	lbs.
[illegible]	2	oz.
Cream of tartar	½	"
[illegible]	3	pints.
[illegible] flavouring		q.s.
[illegible]		

Melt the sugar in the water, and when at sharp boil add the cream of tartar. Cover the pan for 5 minutes. Remove the lid, and let the sugar boil up to crack degree i.e., if a quantity of syrup is allowed to drop on the cool [illegible] it at once sets to a hard mass. At this stage turn out the batch on an oiled stone slab, and when cool enough to handle mould in the acid and flavouring. Pass it through the acid drop rollers, and when the drops are chipped up, and before sifting, rub some icing sugar with them.

FEVER MIXTURE

Quinine sulphate	½	dr.
Sulphuric acid (dil.)	½	"
Syrup orange	1	oz.
Glycerine	4	dr.
Water to make	6	oz.

Dissolve the quinine in the acid and then add the other ingredients.

Adult dose: 1 ounce.

LIQUID MEDICATED SOAP

Coconut oil	1	oz.
Potassium hydroxide	1	dr.
Sodium hydroxide	1	"
Thymol	5	grains.
Distilled water to produce	6	ounces.

Dissolve the sodium hydroxide in one ounce of distilled water and dissolve in a separate vessel the potassium hydroxide in another ounce of water. Now place the coconut oil in a suitable pot and pour the sodium hydroxide solution stirring vigorously until all the sodium compound has been absorbed by the oil. Then add the potassium hydroxide solution and again stir so as to saponify the whole of the coconut oil. Then incorporate the thymol and allow the soap to stand for 15 minutes.

CORN SOLVE

Benzoated lard	11	oz.
Yellow beeswax	2	"
Wool fat	3	"
Salicylic acid	6	dr.
Methyl salicylate	2	"

Triturate all the ingredients in a mortar and then pack.

LINIMENT OF ACONITE

Aconite root, in powder	20	oz.
Camphor	1	"
Rectified spirit enough to make	30	"

Moisten the root for 3 days in the rectified spirit, then pack in a percolator and allow the spirit to percolate through the powder. Then add the camphor and make up to 30 oz. with spirit.

Liniment of belladonna may be prepared in the same way as above.

—Recipes [illegible]

DENTAL IMPRESSION WAX

Among the preparations used by dentists for taking impressions are beeswax, guttapercha, and plaster of paris. A reliable formula for such composition is as follows.—

Stearin	8	oz.
Dammar	12	„
French chalk	2	„
Carmine	to	colour.

Melt the stearin and shake into the dammer, previously powdered, then add the chalk and the carmine and geranium oil 30 drops.

SPECIAL GUMS

Certain sizes or gums for stiffening are used in shoe manufacture. Of these, the box-toe gum is a prominent example. The following are the formulas

I.

Dextrine	10	parts.
Talc	10	„
Zinc oxide	3	„
China clay	10	„
Water	20	„

II.

Chalk	15	parts.
Ground mica (80 mesh)	15	„
Dextrine	45	„
Water	35	„

In the above a little more water, than is specified, should be used to dissolve the dextrine, and into this solution, which is apt to be heavy unless very hot are incorporated the other ingredients, a little of each at a time.

LACQUER FOR SHOE HEELS

Cellulose acetate	12	parts.
Acetone	1152	„
Benzol	14	„
Benzyl alcohol	3	„
Industrial spirit	7	„
Triacetin	10	„

Mix in a stoppered bottle.

CHIB SAUCE

Chopped ripe tomatoes	1	gal
Chopped white onions	1	cupful.
Chopped green peppers	1	„
Chopped peppers	1½	„
Gur (brown sugar)	½	„
Ginger	2	tablespoonfuls.
Cinnamon	1	tablespoonful.
Mustard	1	„
Nutmeg (grated)	1	„
Vinegar	1	quart.
Salt	3	tablespoonfuls.
Cayenne pepper	½	tablespoonful.

Peel the tomatoes and onions. Chop the onions and peppers fine Boil all the ingredients except the vinegar together for 2 hours or until soft and broken. Add vinegar and simmer for one hour. Stir frequently. Bottle and seal while hot.

[illegible]

Naphthalene	[illegible]
Oil of turpentine	[illegible]
Petroleum	[illegible]
Phenol	[illegible]

Mix. Apply to the [illegible] camel hair brush.

DRAWING INK

(a) Distilled water	50	[illegible]
Borax	[illegible]	
(b) Shellac, bleached	[illegible]	
(c) Carbon black	[illegible]	

Into the boiling (a) add (b) in small portions at a time till there is a clear solution. Strain.

Dispose (c) in a part of this shellac solution, and thin the smooth concentrate with the balance of it. Add salicylic acid 1/10 per cent. The dispersion of the carbon black is finest when using a colloid mill.

CHUTNEY

Gur	1	seer.
Green ginger	1	„
Garlic	1	„
Raisins stoned	[illegible]	„
Chillies	4	[illegible]
Mustard seed	½	seer.
Vinegar	q. s.	

Boil the gur to a syrup in one seer of vinegar. Pound the other ingredients and mix them together with the syrup in the other [illegible] seers of vinegar. Put it into a large jar and keep it out in the sun for a fortnight.

HAIR TONIC

Beta naphthol	15	gr.
Quinine hydrochloride	[illegible]	
Resorcin	16	
Bay rum	[illegible]	
Distilled water to make	[illegible]	

Mix all together in a stoppered bottle.

PAN MASALA

Coriander seed	[illegible]
Aniseed	[illegible]
Parsley	[illegible]
Nutmeg	[illegible]
Ajwain	[illegible]
Saffron	[illegible]
Seeds of cardamom, major	[illegible]
Seeds of cardamom, minor	[illegible]
Cloves	[illegible]
Dry rose petal	[illegible]
Chua	[illegible]
Camphor	[illegible]

Take all the ingredients [illegible] and soak them in [illegible] Then [illegible] them [illegible] incorporate [illegible] and [illegible]

[illegible] OF INVENTION

[illegible] is said to be [illegible] of expert [illegible] parts whose resistance to [illegible] is necessary has been [illegible] by the General Electric Co., U. S. A. [illegible] a silicone resin and a glass fibre [illegible] said to be the first commercially [illegible] silicone moulding compound. Called [illegible], its outstanding feature is heat resistance; the company claims it will withstand continuous operation at 392°F; it also has high impact and arc resistance, flows well in the mould and will not support combustion.

CREPES PRINTED WITHOUT BLURRING

Textile printers in America are showing considerable interest in a specially developed vat thickener said to be producing excellent results on French crepes and Bemberg sheers. Known commercially as Ambertex M, this vat thickener has two features of immediate interest. It is claimed to penetrate the cloth, completely discharge the ground colour, and print with unmottled, sunbright brilliance. It also has a cohesive action that not only holds the pattern to the exact proportion of the original engraving but also reproduces the pattern with razor-sharp detail.

Field reports say that Ambertex M, by depositing a soft, pliable film on the cloth, eliminates "splitting" on crepes and sheers. This overcomes the well-known tendency of certain thickeners to embrittle, crack or rupture these fabrics.

—TEXTILE RECORDER.

NEW HOMOGENIZER

Laboratory, research and industrial models of the new tri-Homogenizer and disperser are principally manufactured for dispersing pigments and solids and the manufacture of all types of emulsions, with or without pigments. Units are of rugged construction for long sustained performance. Simplicity in design and operation are exclusive and patented features. Laboratory and research models are particularly recommended for use where limited production is sufficient. They are ideally suited for use in pilot plants and testing laboratories, both industrial and educational. Industrial models are available in sizes [illegible], [illegible] and 10.

[illegible] feature is the calibrated adjustment [illegible] an easily operated handwheel. The calibrated dial is located on the main shaft, [illegible] adjustments on this dial being 1—1000 in. [illegible] marking.

[illegible] homogenisers and dispersers can [illegible] with a variable speed drive [illegible] unit. The units are adaptable [illegible] variety of [illegible] and [illegible] processes [illegible] for [illegible] or heat [illegible].

[illegible] models have [illegible] of [illegible] a [illegible] that has proved highly satisfactory for homogenising many products.

—CHEMICAL [illegible].

STORAGE BINS FOR GRANULAR MATERIALS

An interesting design of steel storage bin for sand, gravel, coal and all granular materials is being marketed by Shaw Ritter, Ltd. It is available in a range of sizes and one great advantage is that it is self-cleaning, the entire bin capacity being 'live' storage. It is positioned off the ground in such a way that vehicles can drive directly beneath and load at the rate of 10 tons/min. Clamshell gates and normal equipment, but volume or weighing hoppers can be fitted. Operating controls of the bin gates are usually arranged at ground level, but special requirements can be met.

CHLORINE WITHOUT CAUSTIC

A newly developed process which produces chlorine without caustic soda was described by Charles P. Roberts. The new process would use waste or surplus hydrochloric acid gas as the raw material and would yield a high-purity chlorine gas as the product.

Mr. Robberts, who is connected with the Westvaco Chemical Division of the Food Machinery and Chemical Corporation of South Charleston, described the process as being superior to other known methods for recovery of chlorine from hydrochloric acid in several respects, notably those of purity of product and economy of operation, but he pointed out that other methods are also being studied. According to him, the process, in its most practical form, consists of the electrolysis of cupric chloride to produce chlorine gas and cuprous chloride. The cuprous chloride thus produced is then oxidised by hydrochloric acid and oxygen to produce more cupric chloride, which is returned to the electrolysis step.

—CHEMICAL ENGINEERING & PROCESS INDUSTRIES.

NEW METHODS OF PRODUCING CHLORINATED BENZENE

Robert M. Crawford, consulting engineer of Buffalo, New York, described the application of the old Deacon process to new methods for producing chlorinated benzene. The chlorinated benzene is later converted to phenol.

Normally, when chlorine is added to organic chemicals like benzene, hydrochloric acid is formed as a by-product and half of the chlorine is lost. By use of the old Deacon process, the by-product hydrochloric acid can be converted back to chlorine with the use of air. These reactions are now carried out in a single step by passing chlorine, air and the benzene through tubes containing newly developed catalysts, which permit operations at temperatures below 500°F.

—FORMULAS, PROCESSES & ANSWERS

DIGESTIVE TABLETS

761 I.A.K., Dhrapha—Wants to have formulas of digestive tablets, gripe cure, rose water, etc.

Sugar double refined	30	parts.
Bismuth subnitrate	60	"
Saccharated Pepsin	45	"
Pancreatin	45	"
Tragacanth mucilage	35	"
Ginger powder	30	"

Mix and divide into tablets of suitable size.

GOLD & SILVER FINISHING OF LEATHER

641 S.V., Lucknow—Desires to know the process of gold and silver finishing of leather.

For gold finish, the leather should be preliminarily coloured with a dye of the composition: Orange dye 0.05 and metanil yellow 0.04, lacquered, and treated under a pressure of 4.5-5 atmospheres with a mixture of bronze powder 100, butyl acetate 750, amyl acetate 750, lacquer 1000, castor oil 1.5 and tritolyl prosphate 0.5 part by wt. For silver finish the leather is greased and neutralized, then treated under pressure with aluminium powder 100, butyl acetate 1000, amyl acetate 1000, Zapon lacquer 1100, castor oil 1.5 and tritolyl phosphate 0.5 per cent.

COLOURING ALUMINIUM ARTICLES

661 J.N., Delhi—Wants to know a process of colouring aluminium articles.

In cases where simple immersion methods for producing protective colouring of aluminium instead of the more elaborate and costly eloxal processes (anodic treatment) are desired, the following recipes are found to give satisfactory results. A solution in one litre of water of 5-10 g. potassium permanganate, 2-4 c.c. nitric acid of 1.35 specific gravity (28°Be), and 20-25 g. copper nitrate is used for black colouring; and 5 g. copper nitrate for brown colouring. The solution is applied almost boiling, at 80°C. The depth of colour depends on the time of immersion, light brown is obtained in about 5 minutes, deep brown in 10 to 15 minutes, deep black requires 20 to 30 minutes.

A solution of 10-20 g. ammonium molybdate, 5-20 g. solution acetate in 1 litre water to which some ammonium chloride was added gave a deep black colour in about 1 minute. The colour is quite durable, it will stand bending without coming off. The objects must be well washed to remove all chloride from pores.

A fine, velvety grey colour is obtained by immersion in boiling solutions of 100 g. diammonium phosphate and 5 g. [illegible] in 1 litre water.

In general, mechanical cleaning of the objects by scraping, brushing, and [illegible] gave better colouring than pickling before immersion; pickling often resulted in a [illegible] appearance.

FUMIGATING PASTILES

762 P.C.W., Nandyal—Wishes to have a good formula of fumigating pastiles.

In order to obtain new odour notes, perfumers resort to the use of many of the modern synthetics as well as spices such as cardamom and cubebs. The essential oils and gum-resins are added in such proportions that the finished powder is damp and adherent. It can then be easily pressed into a conical shape, placed on an ash-tray and lighted. An example of this type is given:—

Siam benzoin	150	parts.
Sandalwood, in powder	300	"
Cascarilla, in powder	150	"
Saltpeter	30	"
Cardamoms, in powder	40	"
Cubebs, in powder	35	"
Myrrh	10	"
Grain musk	5	"
Bergamot oil	30	"
Patchouli oil	10	"
Neroli oil	20	"
Cassia oil	15	"
Clove oil	5	"
Peru balsam	30	"
Orris oleo-resin	10	"
Iso-butyl cinnamate	30	"
Methyl ionone	10	"
	1000	

TIN PRINTING

788 M.C.I., Jullundur City—Desires to know a process of tin printing.

The modern method of printing upon tinned plates is an application of offset printing. The printing machines may belong to either the flat-bed or the rotary type, but they are built for this special purpose and have their own characteristics. The tinned plate, does not actually come in contact with the printing surface; but as it is carried round with the cylinder into which it is fed, it receives an offset impression from a rubber blanket fixed upon a second cylinder, which has already taken a direct print from the printing surface. As the plates are printed they are arranged in racks and kept aside to dry, or they may be put into a stove for forced drying.

Before printing each plate should be thoroughly rubbed on both sides with a [illegible] to remove dirt, grease, etc., which may [illegible] have got upon it, and, which, if left, would [illegible] the ink from [illegible]. [illegible] also be [illegible] of [illegible] the blanket would soon be [illegible].

[illegible] Of course, only transparent yellow [illegible] is usually printed after the white; it [illegible] strong, but where it falls upon the white, and a bright gold where it comes upon the bare tin. It may, however, be had of various shades to suit special requirements. It helps to give depth of colour and brilliancy to solid reds and other colours. It is an important matter for the artist when drawing the design to take full advantage of the light colours. The black printing would come next, followed by the red and blue. After the work has dried, the plates are varnished and then stoved, after which they are ready for the tin box workers.

As with ordinary offset printing the rubber blanket will require to be washed several times during the day. This should be done with a very volatile liquid such as solvent naphtha, spirits of turpentine, or benzoline, and it should be immediately afterwards dusted over with fine flour of sulphur. This treatment will impart to the rubber a fine printing surface.

All designs to be printed on tin should be specially lithographed by an artist with experience of tin plate work. Type matter must be reversed.

BOOK BINDING CLOTH

800 S.M.M.S., Madras—Wishes to have a process of making book binding cloth.

Book binder's cloth may be manufactured by coating thinly and evenly on one side of cotton cloth with an enamelled paint and then by embossing it so as to imitate leather or morocco.

An improved process for making book covers is given below:—

In this method book covers are made in endless strips by using a composition of oils [illegible] by mixture with fibrous substances and colouring matter and pressed through embossed rollers, which produces a resemblance of morocco, but with sharper outlines capable of being washed. The mixture principally used consists of 100 parts of oxidised linseed oil, 10 of resin, 10 of copal, 20 of white lead, 10 of colouring matter, 20 of sawdust, and 10 of paraffin wax. These substances are intimately mixed in a horizontal cylinder heated by steam. The cylinder is provided with a shaft with inclined wings by which the contents are carried forward and pressed out through an aperture in similar manner as the clay in a kneading machine. When the mixture is ready it is spread upon a [illegible] dry spreading on repeated [illegible] enamel thus formed is about [illegible] solid oil is then ground together with the [illegible] upon which it has been formed.

JAPAN BLACK

810 H.S., Jullundur City—Wants to know process of manufacturing Japan Black.

The following is a good japan black for metal surfaces:—Take 12 ounces of [illegible] 8 ounces of asphaltum. Fuse by heat, and add ½ pint boiled linseed oil and 2 ounces of resin. When cooling add 16 ounces of oil of turpentine.

DDT POWDER

827 P.P.W., Poona City—Desires to know recipes of DDT powder and solution.

DDT	10 parts
Pyrophyllite	90 „

It is reported that milling the DDT with diluents prevents some difficulties. In addition to the above base, a variety of talcs, clays and soapstone have been used.

DDT SOLUTION

To prepare DDT solution take DDT 20 parts and put it in carbontetrachloride 80 parts. Shake for a few minutes and then keep aside for a few days.

ENAMEL PAINTS

814 G.D.M., Deoli—Desires to know formulas of manufacturing enamel paints.

The enamelled paints can be made by mixing varnish and pigments. The oil varnish is heated and reduced about 25 to 35 per cent. by the evaporation of spirit, and the colours are added while the varnish is hot. For a white paint either white lead, zinc white, or barium sulphate is used with larger quantities of turpentine and some china clay if a matt surface is required. Driers are also added, manganese borate being a favourite substance. The following formula is generally recommended:—

Zinc white	18 lbs.
White lead	6 „
Oil varnish	12 gallons
Oil of turpentine	12 „
Rosin	3 lbs.
Blue	a trace
Manganese borate or calcined zinc sulphate	4 to 10 oz.

AUTOMOBILE WAX POLISH

Carnauba wax	120	parts
Kerosene oil	50	"
Stearic acid	15	"
Oleic acid	8	"
Benzaldehyde	6	"
Triethanolamine	8	"
Water to make	825	"

Melt the carnauba wax, stearic acid and oleic acid. *Remove from* fire and add the kerosene oil and benzaldehyde. Stir thoroughly. Now add a hot solution (80°-85°C) consisting of 240 parts of water and the triethanolamine. Stir well until a smooth emulsion is formed; then add sufficient hot water to make 825 parts. Continue stirring until nearly cold; then bottle.

GLYCERINE FROM SOAP LYE

958 P.S.P., Ellore—Desires to know a process of extracting glycerine from soap lye and also manufacture of linseed oil.

The following method of extracting glycerine is generally followed by manufacturers: The soap lye, which contains 3 to 8 per cent. of glycerol and 8 to 14 per cent. of salt, is cooled and a little lime added to precipitate the fatty acids as lime salts, the precipitate is separated by filtration and the lye is then neutralised with acid, any fatty acids which separate being skimmed off. It is evaporated in a lead-lined vessel until it has a density of 34°Be. A considerable amount of salt separates during evaporation, and is removed from the vat when it is emptied. After the removal from the evaporator the crude glycerine is allowed to stand so that any suspended salt may subside, it is then pumped into a large copper still in which it is distilled by means of steam which is superheated to 350°C. by passing it through a coil of pipes in the fire-place below the retort, a vacuum being maintained throughout the plant by means of a pump. The glycerine is condensed in a series by atmospheric condensation.

The glycerine obtained by the above process is not quite pure, since it contains some water and is coloured more or less yellow by traces of organic matter. The water is removed by heating it in a pan with a closed steam coil until it reaches a density of 1.26, when it is sufficiently pure to be used for most commercial purposes.

LINSEED OIL

Linseed oil is prepared by a process of expression. For this purpose cleansed linseed as are obtainable in the market on a basis of 95% [illegible] per [illegible] pure [illegible] cleaning [illegible] and free from [illegible] ghanis and in use for a regular [illegible] for the [illegible] total yield of linseed oil in ghanis varies from [illegible] to [illegible] under commercial conditions the [illegible] 33 per cent. for small linseed and [illegible] cent. from bold. Crushing by ghanis is [illegible] common in the Central Provinces and [illegible] India, where the linseed oil is used [illegible] oil.

Power driven mills generally work in the towns and cities and are equipped with [illegible]lers, hydraulic presses and rotary ghanis. Cage and screw presses and solvent extraction plants do not appear to be used for crushing linseed in India.

In power driven mills the linseed is [illegible]ly passed to the rolls or crushing machinery where the seed is ground and pulverised. After the seed is converted into meal, it is elevated into the kettle or heater where it is heated and tempered. The meal is here moistened and raised to a high temperature by means of saturated steam. This operation facilitates the flow of oil when in the press and solidifies any albuminous matter present with it. From the kettle the heated and tempered meal is drawn off into the moulding machine or former where it receives a preliminary pressing before being placed in the Anglo-American Press, which system is generally used for expression of linseed oil. As the cakes are moulded or formed by the moulder, they are taken from this forming machine on steel trays provided for this purpose. As soon as one press has been filled in the above manner by the pressman, he turns on the hydraulic pressure to the press from the pumps or accumulators, as the case may be. With the rise of pressure in the press, the oil begins to flow the compressed meal, slowly at first and then very rapidly, gradually ceasing when the bulk of the oil has been removed and when the pressure has been on three or four minutes, the flow of the oil ceases practically, the oil simply dripping away from the now compressed cakes, until the pressure is turned off. If more presses than one are being used, they are filled one after the other, until the whole battery of presses is charged. The presses are allowed to remain under pressure for a fixed period, which varies under special conditions from 10 to [illegible] minutes and when the proper time has elapsed, the first press in the series is turned down, [illegible] pressure is turned off and the ram allowed to descend, the cakes being removed [illegible] as the ram descends, and fresh [illegible] introduced whenever a cake [illegible] the cakes are removed from the [illegible] pressman, they are placed on the paring [illegible] or on a table near the paring machine [illegible] man operating this paring machine [illegible] off the bags from the cakes, and [illegible] edges away [illegible] the [illegible] paring machine [illegible]

[illegible]

[illegible]

[illegible] K.H.S., Ankleshwar—Wants to have [illegible] of ultramarine blue and [illegible].

[illegible] clay	100	parts by weight.	
[illegible] of soda	[illegible]	"	"
[illegible] of soda	41	"	"
[illegible]	17	"	"
Sulphur	[illegible]	"	"
[illegible] of soda	[illegible]	"	"

Take the ingredients free from iron and [illegible] fine. Next heat in a muffle furnace in [illegible] pots. This produces white ultramarine and turns green on exposure to air for some time. The latter is mixed with 4 per cent. sulphur and roasted in shallow pans, must be well stirred.

GLUCOSE.

Liquid glucose or Starch Syrup: To prepare it moist potato-starch, carefully purified from nitrogenous matter is employed. 200 parts by weight of water and as much sulphuric acid as serves to make a 0.3 per cent. solution are placed in a leadlined vessel, and 100 parts by weight of starch (weighed dry) made into a milk with water are run into the boiling acid, so that the starch is almost immediately gelatinised. The mixture is then heated in a copper autoclave for one hour under 1 atmosphere pressure, so that about half of the starch is hydrolysed to dextrin and the rest to dextrose (or maltose). The process is finished when a [illegible] gives no coloration with iodine—showing that all the starch has disappeared. The product is a non-crystallisable syrup having a density of 17°Be. The sulphuric acid is neutralised with calcium carbonate, the solution filtered from the calcium sulphate, through a [illegible], evaporated to 32°Be in a vacuum and again filtered precipitated calcium sulphate, through a filter press, and finally decolorised by filtering through animal charcoal, which simultaneously absorbs some of the finer particles of calcium sulphate. The syrup is then again concentrated in vacuum pans to [illegible] and should be clear and colourless.

[illegible] crystals in which [illegible] crystalline dextrose hydrate [illegible] rated by ordinary means from the syrup.

RUBBER STAMP INK.

1618 K.H.N., Vizianagram—Wishes to have a formula of rubber stamp ink.

Methyl Violet	1	[illegible]
Glycerine	[illegible]	[illegible]
Methylated spirit	1	[illegible]
Hot water	30	parts.

Dissolve the dye in the hot water and then add the glycerine and set aside to cool. When cold add the methylated spirit.

BOTTLE CAPPING COMPOUND.

Gelatin	1	oz.
Gum arabic	1	"
Water	14	fl. oz.
Boric acid	30	"
Starch	3	oz.

Mix the gelatin, gum arabic, and boric acid with 14 fl. oz. of cold water, stir occasionally until the gum is dissolved, heat the mixture to boiling, remove the scum, and strain. Also mix the starch intimately with the remainder of the water, and stir this mixture into the hot gelatine mixture until a uniform product results. As desired, the composition may be tinted with any suitable dye. Before using, it must be softened by the application of heat.

PERFUMED CARDS.

Perfumed cards are often used for advertising purposes and are better perfumed before printing. For this purpose the card in sheets is placed in a specially constructed chamber and the perfume volatilised at a low temperature from a shallow tray in the bottom. This method yields uniform results and is better than immersion, when the sheets are apt to crinkle or come out in streaks. The perfume chosen is generally the one being advertised when it should be prepared for the purpose in concentrated form. An example of lavender perfume is given:—

Lavender oil—English	[illegible]	parts
Lavender oil—French	150	"
Bergamot oil	200	"
Thyme oil	20	"
Rosemary oil	30	"
Oakmoss absolute	20	"
Patchouli oil	30	"
Musk ambrette	25	"
Coumarin	25	"
Tincture of benzoin, 10 per cent	450	"

CAUSTIC SODA FROM REH.

1094 C. J. P. O. M., Bharthana—Wants to have a process of making caustic soda from reh.

500 parts of sajji (reh) is dissolved with 2600 parts water; and 183¾ parts of freshly prepared lime (calcium oxide) dissolved with three times of its weight of water is added to the boiling reh solution gradually with vigorous stirring. By this treatment about 92.4 per cent. of carbonate present in the reh is converted into caustic soda, the specific gravity of the resulting liquor being 28°Tw. The clear liquor is next separated from the lime mud and concentrated. As the reh contains some appreciable amount of sulphate of soda it is first crystallised out because it is less soluble than caustic soda. The crystal which first forms is mainly sulphate and is removed. The mother liquor which is now almost free from sulphate is further concentrated and ultimately evaporated to dryness in nickel vessels. The substance thus obtained is finally fused over moderate fire. In this way a practically colourless caustic soda may be obtained, the organic matter present being destroyed during fusion.

IRIDIUM POINTED GOLD NIB.

1104 T.G.M., Nandyal—Wishes to know a process of making iridium pointed gold nibs.

In making gold nibs, gold is melted and alloyed to about 14 carats fine with suitable proportions of silver and copper, and rolled into a long narrow ribbon from which pen blanks or flat plates in the shape of a pen are cut by means of punch and die in a power press. The blunt nib of the blank is notched or recessed at the end to receive the iridium that form the exceedingly hard point which all good gold pens possess. The iridium is coated with a cream of borax ground in water, and laid in the notch [illegible] thing [illegible] which the [illegible] solidly with the iridium. [illegible] passed between rollers of [illegible] give the gradually diminishing [illegible] the point backward. [illegible] cavity in which the [illegible] um pointed nib is placed, to [illegible] the iridium. After rolling the [illegible] pen is stiffened and rendered [illegible] mering.

The pen is then trimmed by a press [illegible] to that which is used for cutting out the blanks, or by automatic machinery. When the blank has been trimmed, the name of the manufacturer and the number of the pen is stamped on it. The pen is then given its convex shape in a suitable press, the blank being pressed between a concave die beneath and a convex punch above. Quite a little force is necessary to the required convexity, and when this operation is completed two jaws approach the blank and press it up on the opposite edges, thus giving the pen its final shape. The next step is to cut the iridium into two points by holding it on the edge of a very thin copper disc, which is charged with very fine emery and oil and revolves at a high speed. The nib is then slit by a machine and the slit is cleared by means of a fine circular saw. After slitting, the nibs are brought together by hammering, and the pen is burnished on the inside in a concave form and on the outside in a convex form. This is necessary in order to give the pen a uniform surface and greater elasticity. These nibs are then set by the fingers alone, after which operation the pen is ground by a lathe with a thin steel disc and a copper cylinder, both charged with fine emery and oil. After the grinding is done, the pen is polished upon a buff wheel, which completes the process of manufacture. Lastly the finished pen is inspected to see that it possesses the proper elasticity, fineness, and weight before fixing.

POLISHING GLASS.

1105 S.S.M., Ajmer—Wants to have recipes for polishing glass.

Mix calcined magnesia with purified benzine to a semi-liquid paste. Rub the glass with this mixture by means of a cotton wad, until it is bright.

[illegible]

[illegible] H.M.A., [illegible]—Refer your query to [illegible] Royal Calcutta Turf Club, [illegible], [illegible] Calcutta.

[illegible] K.C., Kanpur—In order to increase [illegible] of [illegible] maker's ink increase the [illegible] of [illegible].

[illegible] R.H.R., Tenali—For embossing [illegible] enquire of Asad & Co., Aligarh and [illegible] Machinery Supplying Agency Ltd., [illegible] [illegible] Extension, Calcutta.

[illegible] S.N., Calcutta—For selling herbs you [illegible] with Banshidhar Dutt, 126, [illegible] Street; P. C. Dawn & Co., [illegible] Bazar Street and Dawn & Co., 11, Portuguese Church Street, all of Calcutta.

1443 I.H.S.W.F., Alwar—Process of manufacturing saccharine will appear in Formula Section in due course.

1444 A.N.B., Jagadhri—For borax you may enquire of Allied Agency, 15, Bonfield Lane, Calcutta and Calcutta Chemical Co. Ltd., 10, Bonfield Lane, Calcutta.

1445 R.S.S., Tirupur—We do not understand what you mean by celloshone paste used as a raw material in soap manufacture.

1446 M.A., Lahore—For indigo write to Dalsingserai Indigo Concern, Dalsingserai, Darbhanga and Sarsee Indigo Concern, Sarsee, Purnea. Process of manufacturing colour from indigo will appear in Formula Section in due course.

1447 V.R., [illegible]—For polishing spectacles [illegible] you may try the following: Montan wax [illegible]; tallow 2 parts; diglycol oleate 1 part; [illegible] and fibres 12 parts.

1448 G.D.S., Sacli—Following is a formula of [illegible]: Musk 10 grains; ambergris 10 [illegible]; powdered benzoin 1 oz.; powdered [illegible] 1 oz.; powdered [illegible] 1 dr.; [illegible] nitre 1 dr.; powdered charcoal 2 oz. [illegible] make in a thin paste with mucilage of [illegible] when sticks are made by dipping [illegible] splinters into the emulsion.

[illegible] S.R.D., Gauhati—You may consult [illegible] Indian Directory published by [illegible] & Co. (19[illegible]) Ltd. [illegible] and Kelly's World Directory [illegible] Kelly's Directories Ltd. [illegible] [illegible] W. C. [illegible]

[illegible]

[illegible] the Young published from this office [illegible] Rs. 2/7/- including postage.

1453 S.V.A., [illegible]—For selling [illegible] utensils you should advertise in newspapers.

1454 P.R.C., Bombay—For [illegible] you may enquire of Krishnalal Tharani & Co., [illegible] 3, Royal Exchange Place, Calcutta; [illegible] & Co., 40, Strand Road, Calcutta; [illegible] Ltd., 168, Armenian Street, Madras and Kantilal Bhogilal & Co., Nagdevi Cross Lane, Bombay.

1455 N.R.C., Coimbatore—Address of United Rubber Works Ltd., is 61, [illegible] Road, Calcutta; address of Assam Bengal [illegible] Works is 11, New Tangra Road, Calcutta; address of Asiatic Rubber Works is [illegible] Chingrighata Road, Calcutta and address of India Rubber Guttapercha & Telegraph Works Co. Ltd., is 7, Old Court House Street, Calcutta.

1456 S.A.K., Dacca—You may consult Independent Careers for the Young published from this office, price Rs. 2/7/- including postage.

1457 V.C., Gadag—For American address you may write to American Trade Commissioner, 9-10, Esplanade Mansion, Calcutta. For addresses of the Switzerland write to the Swiss Trade Commissioner for India, Burma and Ceylon, Gresham Assurance House, Sir P. Mehta Road, Bombay. For addresses of France write to The French Trade Commissioner, 12, Park Mansions, Park Street, Calcutta.

1458 N.G.K., Ghaziabad—You may obtain lampblack by burning crude oil. We have no chemical dictionary. Tablet making machine may be had of Small Machineries Mfg. Co., 22, K. G. Kar Road, Calcutta. Chemicals may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane, Calcutta.

1459 A.S., Wankaner—For fountain pen engraving machine enquire of Batliboi & Co., Forbes Street, Fort, Bombay; Bombay Machine Store Co., Laxmi Bldg., Nagdevi Cross Lane, Bombay and Chimanlal Patel & Co., 174, Hornby Road, Fort, Bombay.

1460 H.M.G., Goalpara—Wants to be put in touch with the suppliers of picture transferring soap. An articles on transfer picture manufacture appeared in July 1950 issue of Industry.

1461 G.V.S., Bombay—For pencil making machine enquire of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta and Batliboi & Co., Forbes Street, Fort, Bombay. Process of manufacturing pencil will be found in Industry Prize Articles published from this office. Following is a list of pencil manufacturers: F. N. Gupta & Co., 13, Beliaghata Road, Calcutta; G. C. Law & Co., 2, Cornwallis Street, Calcutta; Madras Pencil Factory, 6, Stringer Street, Madras; Victory Pencil Co., Beach Road, Quilon and Popular Pencil Works, Quilon, Travancore.

1462 A.I.S., Dibrugarh—For manufacturing glass following raw materials are required: Silica, sand, sandstone, felspar, soda ash, sulphate of soda, carbonate of potash, lime, chalk limestone, etc. A furnace is required for manufacturing glass.

1463 W.L., Simla—For steel pipes you may enquire of Tata Iron & Steel Co., Ltd., Tatanagar, B. N. Ry.

1464 P.O.M., Pratapnagar—To clarify castor oil mix 100 parts of the oil at 95°F with a mixture of 1 part of alcohol (96 per cent.) and 1 part of sulphuric acid. Allow to settle for 24 hours and then carefully decant from the precipitate. Now wash with warm water boiling for ½ an hour, allow to settle for 24 hours in well closed vessels after which time the purified oil may be taken off.

1465 K.S., Bangalore City—Bauxite may be had of Calcutta Mineral Supply Co., Ltd., 31, Jackson Lane, Calcutta.

1466 V.C., Kundara—Battery manufacturing materials may be had of Calcutta Mineral Supply Co., Ltd., 31, Jackson Lane, Calcutta. For machine write to International Trading Co., 12, Netaji Subhas Road, Calcutta and Industrial Machine Co., 14, Netaji Subhas Road, Calcutta.

1467 B.C., Madawachchi—You may try with sulphuric or hydrochloric acid.

1468 D.Y.S.R., Anaparti—Tablet making machines may be had of Small Machineries Mfg. Co., 22, R. G. Kar Road, Calcutta.

1510 M.R., Perundurai—We have no book dealing exclusively with house wiring. The Electrician contains a chapter on house wiring.

1511 D.S.S., Saklaspur—See under No. 1618.

1514 M.P.Y., Mergui—Address of Tropical Agriculturist is Colombo, Ceylon.

1515 S.M.R., Mymensingh—Following is a list of rubber stamp manufacturers: B. Goray & Co., 156, Cornwallis Street; Genuine Rubber Stamp Manufacturing Co., 7, Lall Bazar Street and H. C. Bysack, 4-1, Becharam Chatterjee St.; all of Calcutta. Rubber stamp making accessories may be had of the above firms.

1516 R.P.D., [illegible] with any querist write [illegible] initials care of Industry [illegible] be redirected.

1517 S.A., Katni—[illegible] to vegetable ghee in [illegible] our to 1 md. vegetable ghee. [illegible] in Hindi.

1518 A.V.A.C.C., Coimbatore—[illegible] over to Kanpur and learn the process of [illegible] manufacture.

1519 N.S.M., Bombay—We have no such book. You may however write to Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, Calcutta for the book required.

1520 S.R.I., Kakinada—Process of manufacturing bottle capsule will appear in Formula Section in due course.

1521 W.M.W.L.F., Katunneriya—Please write in English.

1522 B.P.A., Kanpur—Questions are replied by post on receipt of 8 annas stamps for each question.

1523 R.A., New Delhi—Your letter has already been redirected.

1525 A., Chandausi—To communicate with any querist write him with number and initials care of Industry when your letters will be redirected. For technical books write to Thacker Spink & Co. (1933) Ltd., 3, Esplanade East, and W. Newman & Co. Ltd., 3 & 4, Old Court House Street, both of Calcutta. Following is a formula of agarbatti: Benzoin 100 parts; tolu balsam 50 parts; charcoal 100 parts; saltpetre 50 parts; sandal oil 50 parts; patchouli oil 15 parts; cascarilla oil 30 parts; grain musk 5 parts. Mucilage of acacia, a sufficient quantity to make thick syrupy consistency. To make sticks dip into this dry splinters of bamboo and expose them vertically in the sun to dry.

1526 R.K.C., Lashkar—For thermometers you may enquire of Butto Kristo Paul & Co. Ltd., 1 & 3, Bonfield Lane and M. Bhattacharyya & Co., 80, Netaji Subhas Road; both of Calcutta.

1527 S.C.D., Jharia—You may consult Manufacture of Soap; Manufacture of Ink and Prospective Industries, price Rs. 2/7/- each including postage.

1528 J.K.G., New Delhi—You may consult Manufacture of Ink published from this office, price Rs. 2/7/- including postage. This book contains formulas and processes of manufacturing all sorts of ink.

1530 D.I.P., Salem—Process of manufacturing sodium silicate will be found in Industry Prize Article II published from this office.

[illegible] ... you may write to [illegible] ... 10, [illegible] Lane and [illegible] House, 7, Colootola Street; both ... You may consult Indian Perfumes, ... Hair Oils published from this [illegible]

[illegible] R.C.G.B., Thana—Address of Indian [illegible] Manufacturers' Association is 23B, Netaji [illegible] Road, Calcutta.

[illegible] R.K., Bombay—For quince seeds enquire of the following firms: Banshidhar Dutt, 136, Khengrapatty Street, Calcutta; Dawn & Co., 11, Portuguese Church Street, Calcutta and Bengal Herbs Stores, 3, Mullick Street, Calcutta.

1543 S.S.M., Amritsar—For selling timber you should advertise in Industry.

1544 J.C.G., Jubbulpore—Process of manufacturing bar soap appeared in September 1949 issue of Industry.

1546 S.R.K.R., Guntur—Process of manufacturing sand and emery powder appeared in September 1949 issue of Industry.

1547 J.B., Delhi—For silk, Kapok cotton write to Bhaduri Bros., 95, Akhil Mistry Lane, Calcutta and General Export Co., 1, British Indian Street, Calcutta. Following is a list of woollen goods manufacturers: Ahmed Woollen Mills, Karim Bldg., Mohamedali Road, Bombay; Sir Shapurji Broacha Mills, Bombay and Krishna Woollen Mills, Albert Bldg., Hornby Road, Bombay.

1548 S.R.W.F., Pudukkottai—We have no book on thread ball manufacture.

1549 S.S., Kanpur—Process of manufacturing dextrine will appear in Formula Section in due course.

1552 M.L.S., Baroda—For ointment mixing machines enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta. Collapsible tube filling machines may be had of International Trading Co., 13, Netaji Subhas Road, Calcutta.

[illegible] J.S., Delhi—For holdalls write to [illegible] Bhandar, 90-2A, Harrison Road; Bengal [illegible] Leather Works, 10B, St. James Square; [illegible] Factory, 75/1, Harrison Road and [illegible] Bros. & Co., 90-4A, Harrison Road; all of Calcutta.

[illegible] C.I.L., Delhi—Collapsible tubes may be had of Metal Box Co. of India Ltd., 83, [illegible] Road, Kidderpur, Calcutta.

[illegible] M.P.T., Lucknow—Process of nickel [illegible] will appear in Formula Section in due course.

[illegible] M.M., Bankura—Process of manufacturing [illegible] from waste paper will appear in Formula Section in due course.

[illegible] ... on type founding ... manufacture on small scale ... enquire of Volkart Bros., 3, Netaji Subhas Road, Calcutta and Mitchell Sons & Co. [illegible], Netaji Subhas Road, Calcutta.

1559 D.N.S., Simla—Process of manufacturing butter paper and carbon paper will appear in Formula Section in due course.

1560 J.P.A., Jamshedpur—An article on paper for transfer picture manufacture appeared in July 1950 issue of Industry. There is no institution where practical training is given on transfer picture manufacture.

1562 M.B.S., Hospet—Process of manufacturing fountain pen will be found in Mechanical Industries published from this office, price Rs. 3/7/- including postage.

1563 C.S.N., Kashikode—For sandalwood carved boxes etc. write to Mysore Agency, Mysore.

1564 M.H., Digboi—The groundnut decorticating machines enquire of Batliboi & Co., Forbes Street, Fort, Bombay.

1565 M.S., Brahmadesam—It is not possible to use electric heater for manufacturing ayurvedic medicine. The glass pot is put in sand which is heated by fuel from underneath. Whereabout of the books is not known. You may write to Bombay Government for a book on jari industry.

1567 V.K.S., Mehkar—Rosin may be had of Hiralall Debi Prasad, 43, Banstolla Street, Calcutta and National Rosin & Turpentine Mfg. Co., 27, Baranashi Ghosh Street, Calcutta. Creosote oil may be had of Calcutta Chemical Co. Ltd., 10, Bonfield Lane, Calcutta.

1568 S.S., Lucknow—Formulas of nail polish and hair oil will be found in April 1950 issue of Industry. For antirust solution you may use hydrochloric acid. For corks enquire of Fital Cork Co., 153-1, Radha Bazar Street, Calcutta.

1569 A.I.T.M.A., Bangalore—[illegible] book on finger print testing. You [illegible] enquire of Thacker Spink & Co. [illegible], Esplanade East, Calcutta.

1571 I.J., Surat—We have no book on painting. In order to become an expert painter you should be apprentice with an expert painter.

1572 R.A., Akola—For lottery enquire of Royal Calcutta Turf Club, 13, Russell Street, Calcutta. Want to be put in touch with suppliers of pictures of Kali, and Shankh and Kawadi merchants of Rameshwaram.

1573 R.E., Delhi—For transfers write to Singnograph, Baranagore, Near Calcutta. For butter and tissue paper enquire of Raghunath Dutt & Sons Ltd., 33/2, Beadon Street and Mukherjee Dutt & Co., 31, Jackson Lane; both of Calcutta.

1574 H.K., Chaibasa—Electric goods may be had of Biswas Trading Co., 55-58, Ezra Street; A Acharjee & Sons, 49, Ezra Street; Bengal Electric Stores Supply Co., 53, Ezra Street and Bikaner Electric Stores, 82, Ezra Street; all of Calcutta. Radio sets and accessories may be had of K. C. Dey & Sons, 161-1, Harrison Road; C. C. Saha Ltd., 170, Dharamtala Street and General Electric Co. (India) Ltd., Magnet House, Chittaranjan Avenue; all of Calcutta.

1575 R.S., Sikar—For pens enquire of Prakash Industries, 8-3, Maharshi Debendra Road, Calcutta.

1576 P.G.M., Cachar—For sewing machines enquire of Jay Engineering Works Ltd., 183, Prince Anwar Shah Road, Dhakuria, Calcutta, and K. C. Mullick & Sons Ltd., 77-13, Dharamtala Street, Calcutta. Toys may be had of Doll, Dummy & Toy Manufacturing Co., 27, South End Park; Dolls House, 7, Balaram Ghosh Street; Lakshmi Cottage Industry, 93-4, Hari Ghosh Street and Turun Silpa Agency, 62, Manicktala Street; all of Calcutta. Hurricane lanterns are manufactured by A. K. Sarkar & Co., Barrackpur Trunk Road, Baranagore; Jay Engineering Works Ltd., 183, Prince Anwar Shah Road, Dhakuria, Calcutta; Ogale Glass Works Ltd., Ogalevadi, Satara and Oriental Mild Metal Industries Ltd., 34, Chittaranjan Avenue, Calcutta.

1577 C.A.P., Ladol—You may consult Utilisation of Common Products published from this office, price Rs. 3/7/- including postage. The book contains process of manufacturing glue and bone products. For machines enquire of Marshall Sons & Co., Ltd., 99, Netaji Subhas Road, Calcutta and Volkart Bros., 8, Netaji Subhas Road, Calcutta.

1578 S.C.M., Calcutta—For patent registration you may write to Controller of Patent, 214, [illegible]

[illegible]

[illegible] Indus[illegible] of Industry [illegible]

[illegible] G.S., Delhi—[illegible] moulding powder is [illegible] in place of cellulose [illegible]

1581 S., Lucknow—[illegible] ing resistance will [illegible] in due course.

1582 A.N.B., Jamshedpur—[illegible] stearic acid in place of tallow.

1583 L.B., Gauhati—[illegible] required for manufacturing [illegible] had of Bansidhar Dutt, [illegible] Calcutta.

1584 K.S.W., Ajmer—[illegible] available in India. You may use [illegible] canth and gelatine in place of [illegible] possible to detect the proportion of [illegible] condensed milk.

1585 R.C.P.S., Hoshiarpur—Formulae of proprietory articles are not available. [illegible] the formula of artificial fruit essences [illegible] supplied to you. Other formulae are not available. Following is a list of foreign trade commissioners: U. K. Senior Trade Commissioner in India, Eastern House, Man Singh Rd., New Delhi; Australian Government Trade Commissioner, 3, Fairlie Place, Calcutta; The Commercial Secretary, Office of the High Commissioner for Canada, 4, Aurangzeb Road, New Delhi; The Trade Commissioner for Ceylon in India, Ceylon House, Bruce Street, Bombay; Danish Government Trade Commissioner in India, [illegible] Mansion, New Cuffe Parade, Bombay [illegible]; The Commercial Secretary, Italian Embassy in India, Communication Buildings, 67-69, Connaught Circus, New Delhi; Trade Commissioner for Netherlands and East Indies, 14, [illegible] Street, Bombay and Commercial Representative of the Turkish Government in India, 1, [illegible] Lane, New Delhi.

1586 R.S.P., Eluru—For glass [illegible] may enquire of Calcutta Glass & Silicate [illegible], 9, Kundu Lane; New Indian Glass Works, 7, Rawdon Street and Jayanti Glass Works, 8, Ezra Street; all of Calcutta. You [illegible] facture chemicals and essential oils [illegible] should be packed in straw.

1587 A.P.S., Kanpur—[illegible] electro homoeopathy are not available.

... With the above firms. For ... may write to ... ... Ltd. ... For ... Sound Equipment ... Road, Calcutta; International Equipment Co., 17, Queen Road, ... French University ... Street, Calcutta. For ... making machines enquire of Martin ... Mission Row and Balmer Lawrie & Co. Ltd., 103, Netaji Subhas Road; both of Calcutta.

1598 N.A., Hyderabad—Process of blending has appeared in November 1949 issue of Industry.

1599 M.J.S., Bhagal—Following is a list of petrol dealers: British Burma Petroleum Co., 11, ... Street, Bombay; Standard Vacuum Oil Co., Neville House, Nicol Rd., Bombay; Western India Oil Distributing Co., Ltd., Alice Bldg., Hornby Road, Fort, Bombay; Anglo-Iranian Oil Co. (India), Ltd., Hongkong House, Calcutta; Burmah-Shell Oil Storage & Distributing Co. of India, Ltd., Hongkong House, Dalhousie Square, Calcutta; Caltex Company (India), Ltd., United India Insurance Bldg., Chittaranjan Avenue, Calcutta and Standard Vacuum Oil Co., 8, Church Lane, Calcutta.

1600 A.T.C.I., Delhi—Fastness will appear by ... the snow for at least seven days. All the formulas are correct. Desired result is not obtained for want of proper manipulation.

1601 R.R., Maharaj—For braiding machine enquire of Oriental Machinery Supplying Agency Ltd., P-12, Mission Row Extension, Calcutta.

1602 P.R.P.C., Bombay—For cycle accessories write to Hind Cycle ..., Kilachand Devchand ..., 337, Apollo Street, Fort, Bombay; ... Bicycle Manufacturing & Industrial ... Ltd., Phulwari Sharif, Patna; India ... Manufacturing Co., Ltd., ... Road, ... Jai Hind Cycle Works, Old ... Paharganj, Delhi. For glass bottle ... of the following firms: Sree Gobindo ... Howrah; ... and ... Glass Works ... Tyres and tubes may be had ... India Rubber ... Ltd. ... may be ...

... appear in Formula Section in due course.

1603 A.H.S., Trichur—Process of ... tasting sugar of milk globules will appear in Formula Section in due course.

1604 K.M.K., Phalodi—We publish only industrial and technical books, a catalogue of which has been sent to you.

1605 H.F.S., Bikaner—You may consult Industry Year Book & Directory 1950-51 where you will get all the addresses required. For foreign addresses you may consult Kelly's World Directory published by Kelly's Directories Ltd., 186, Strand, London, W.C.1.

1606 R.M.S.C., Jamnagar—We have no book on satin white, lamp black and aluminium powder manufacture. Aluminium powder is manufactured from aluminium rods by filing.

1606 C.C.H., Haveri—The paper in this form of a continuous sheet is passed through a bath of melted wax at a high temperature, any excess being removed by squeezing rolls through which the hot waxed paper is passed. The paper is led over skeleton drums and thoroughly cooled before being cut into sheets.

1608 S., Lucknow—Formulas you require will appear in Formula Section in due course.

1610 I.B.M.A., Kanpur—You may try the process which is a latest one.

1611 K.R.J., Ferozepur City—Plastic machine may be had of Francis Klein & Co., Ltd., 1, Royal Exchange Place; Alfred Herbert (India), Ltd., 13-3, Strand Road and Small Machineries Mfg. Co., 22, R. G. Kar Road; all of Calcutta. For plastic powder enquire of Imperial Chemical Industries (India), Ltd., 18, Strand Road, Calcutta. Plastic goods may be had of Plastic Moulders Ltd., 28, Netaji Subhas Road, Calcutta and Hindusthan Plastic Ltd., 109, Parsi Bazar Street, Bombay.

1613 U.B.P., Calcutta—Special kind of ink is required for printing oiled paper. You may write to printing ink manufacturers. Cloth is printed with ordinary ink.

1616 M.N.M., Kathiawar—No such chemical is available which absorbs moisture from the hide.

1617 K.S.K., Trichur—Casein may be had of Khadi Pratisthan, 15, College Square and Khaitan Sons & Co., 2, Dalhousie Square; both of Calcutta. You have to prepare n. c. cotton yourself.

1618 D.S.S., Hassan—Process of manufacturing weed killer will appear in Formula Section in due course.

1620 C.M.C., Calcutta—Formulas of fountain pen ink will appear in Formula Section in due course.

1622 H.S.M.C., Gulbarga — Process of manufacturing sulphonated castor oil and other perfumes will appear in Formula Section in due course.

1627 C.L., Ludhiana — Formulas of blanco and lustre polish will appear in Formula Section in due course.

1628 U.M.D.T., Shwebo—We have no book on dye manufacture from vegetable

1629 P.L.V., Sabkasa—We have no book on lac and other allied industries. You may however enquire of Lac Research Institute, Nankum, Ranchi for books on lac industry.

1630 D.B., Darwha—Address of A. K. Dutt & Sons is not known.

1634 B.K.J., Bezwada—Kanpur katha is a proprietory article hence its formula is not known. We shall however try to publish the same in Formula Section when we shall come across such a formula.

1637 B.D.S., Saharanpur—Following is a list of herbs and drugs: A. L. Chakko, Trichur Cochin; Agarwal Drugs, Kurseong; All India Herb Supply Co. Ltd., Goumukh Bhuwan, Masjid Bridge, Bombay; Amar Nath Kundu & Bros., 14 3, Old China Bazar Street, Calcutta; Banga Lakshmi Bhandar, 18, Cotton Street, Calcutta, Banshidhar Dutt, 126, Khengrapatty Street, Calcutta; Bengal Herbs Stores, 2, Mullick Street, Calcutta; Dawn & Co., 11, Portuguese Church Street, Calcutta and Indian Herbalists Pty. Ltd., 98-1, Netaji Subhas Road, Calcutta.

1638 J.B.F., Agra — You may consult Brushes and Toilet Goods published by Metropolitan Press Agency Ltd., Hazlitt House, Southampton Bldgs., London W. C. 2. For transfer labels you may enquire of Signograph Co., Baranagore, Near Calcutta. Plastic machines may be had of Francis Klein & Co. Ltd., 1, Royal Exchange Place and Small Machineries Mfg. Co. 22 R. G. Kar Road; both of Calcutta. Wants to be put in touch with the suppliers of enamelled aluminium sheets.

1641 S. G., Calcutta—Process of manufacturing pencil will be found in Industry Prize Article published from this office. Graphite is available in Madras and [illegible]. [illegible] pencil has good market in [illegible] prospect is also very good. [illegible] at least Rs. 15,000/- for the above [illegible]

1642 M.D.O.W., Rohtak—As far [illegible] know there is no firm in India manufacturing optical frames. For optical frames you may enquire of James Murray & Co. Ltd., [illegible] Court House Street, Calcutta. Optical [illegible] making machines may be had of Alfred [illegible] (India) Ltd., 12/3, Strand Road, Calcutta. For button making machines enquire of Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta.

1643 P.C.D., Cuttack—For pug mill enquire of Martin-Burn Ltd., P12, Mission Row, Calcutta and Oriental Machinery Supplying Agency Ltd., P12, Mission Row Extension, Calcutta.

1644 O.R.M.C., Katni—To communicate with any querist write him with number and initials care of Industry when your letters will be duly redirected.

1645 R.C., Kanpur—In order to impart lustre to shoe maker's ink increase the proportion of shellac to 2½ oz. in the Formula referred to by you.

1646 B.S., Ludhiana — Yarn making machines may be had of W. H. Brady & Co. Ltd., Mercantile Bldg., Lall Bazar, Calcutta.

1647 A.I.L., Patna — Collapsible tubes may be had of Metal Box Co. of India Ltd., B2, Hide Road, Kidderpur, Calcutta. Collapsible tube filling and sealing machines may be had of International Trading Co., 12, Netaji Subhas Road, Calcutta.

1650 E.R.A., Nagpur — Refer your query to Sen & Pandit, Mercantile Bldg., Lall Bazar, Calcutta.

1651 G.K.R., Vizianagram — Small oil mill or rotary mill may be had of Girish Chandra Bysack & Co., 236, Upper Circular Road, Calcutta. For chemical analysis of ore you may enquire of R. V. Briggs & Co., 3 & 4, Garstin Place, Calcutta. Following is a list of mineral merchants: Calcutta Mineral Supply Co. Ltd., 31, Jackson Lane; Bagri Mining Syndicate, 82, Cross Street; Azad Hind Mineral & Industries Ltd., 8-2, Hastings Street; Indian Mineral Agency, 14/2, Old China Bazar Street and Indian Mineral Industries Ltd., 22/1, Dum Dum Road; all of Calcutta.

1652 S.L.M., Jubbulpore — — We have no book on spectacles frame manufacture.

1653 B.S.W., Bilaspur — Reply to your letter has been sent by post.

LIFE AND WORK OF SIR SHANTI SWARUP BHATNAGAR by Norah Richards. Published by New Society of India, Devnagar, [illegible], New Delhi, Pages, 230, price, Rs. [illegible].

Sir Shanti Swarup Bhatnagar is one of India's most distinguished scientists and the State has honoured the savant by appointing him Director of the Council of Scientific and Industrial Research. In that capacity Dr. Bhatnagar has been making valuable contributions towards the building of peace within the country by directing research work the fruit of which can be utilized for the purpose of rehabilitating and developing India's industrial economy. According to the writer of this biography, Sir Shanti's "Baptismal" name "has provided a staff from which to fly the flag of peace". The words should not be taken for a mere encomium. The extracts given in the book from some of Dr. Bhatnagar's speeches amply reveal his love of peace and insistence upon the need to harness science to the task of building world peace and prosperity.

Most 19th. century biographers resorted to panegyrisation of the activities of their subjects. Some of the 20th. century biographers got tired of this fashion and reacted by jumping off to the other extreme end of image-breaking. Mrs. Richards has avoided the extremes and adopted the golden mean. Perhaps, in the matter of panegyrisation her work is more or less in line with those of the 19th century. But there is one important point of difference: the 19th. century biography would often be undertaken deliberately to praise the work of the person it dealt with. But Mrs. Richards' method is not deliberate. She does not resort to excessive eulogising and the words of praise she writes about Dr. Bhatnagar do not seem an artificial superimposition on her work. They form its integral part and are subdued by a delicious tone of moderation.

Mrs. Richards is no mere chronicler of the life and activities of her subject. She has done justice to the art of biography by close fidelity to facts on the one hand and by raising her work to the level of art on the other. In consequence, this life-story of Dr. Bhatnagar reads like an interesting novel. The writer's personal touches enliven the work and her direct acquaintance with her subject lends authenticity to it.

Dr. Bhatnagar is a scientist and it seems, therefore, perfectly natural that his biography would in the main be a delineation of his achievements in the field of science. Mrs. Richards, however, goes beyond the professional career of Dr. Bhatnagar. She talks about his human qualities and aims at revealing the man rather than the scientist in Sir Shanti. For example, Mrs. Richards narrates how after the death of his wife Dr. Bhatnagar became a poet and brought out an anthology of his poems in Urdu naming in after his departed wife. In his younger days, we are told, he was an amateur stage actor of no mean merit.

THE MOTOR VEHICLES ACT. 1939 by Basant Kumar Jaggi, B.A., LL.B., Advocate, Federal Court of India. Published by Lawrence Smith & Co., 32, Jawahar Nagar, Delhi. Pages 172, price Rs. 10/-.

The book is a useful commentary on the Motor Vehicles Act. Besides containing the full text of the Act with the latest amendments thereon it is accompanied with explanatory notes, analysis of different sections and citation of law cases under reference where necessary. The important rulings of various High Courts bearing on this Act have been reproduced section-wise. Separate chapters have been allotted for the sections of the Act, viz. licensing of drivers of motor vehicles, registration of motor vehicles, control of transport vehicles, construction equipment and maintenance of motor vehicles, control of traffics, insurance against third party risks, offences, penalties, etc., etc. A number of schedules with regard to test of competence to drive, limits for speed, traffic signs, signals, registration marks, driving regulations, etc. have been appended for general information. All motor owners, drivers, even police authorities and lawyers will be benefitted by a perusal of the book.

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1. SPIRITUAL PHILOSOPHY IN LIFE. By Minocher K. Spencer. Pages 158, price Rs. 2/-.

2. HYMNS. By Minocher K. Spencer. Pages 117, price Rs. 2/-. Both published by Spiritual Healing Centre, R. S. Puram, P.O., Coimbatore, S. India.

Should man rest contented with superficial facts of life and society? The first named book is a reply to this pertinent question. In all ages, the author says, people have turned to philosophy as solace of life. The author histori-

cally surveys the ethical ideals as propounded by the famous ancient and modern philosophers and spiritual philosophy as taught by the great religious preachers, and presents in the philosophical doctrines of Socrates down to that of present age. The book condemns materialism and glorifies spiritual life devoted to the true realisation of God as the highest attainment of life. This alone can remove the obstacles to the movement of universal peace, humanism and inter-religionism.

The second book contains 112 hymns in English, composed one a day by the author, after usual prayers and meditations. To devote our life to God to consecrate our all to God, to sacrifice everything for the sake of God is the theme of the hymns. Those with devotional spirit will find solace in them.

IS THIS PEACE by D. Pant. Published by Kitab Mahal, Allahabad, Pages 94, price Rs. 2/8/-,

The booklet examines the various conceptions of Peace and its real and unreal aspects. Some think that the only way to obtain peace is to retire from the world and attune with the infinite. Some visualise peace in a state of suspension. Some adhere to passivity school relying upon their fate and actions in previous birth. The author pleads for a new ideal of peace. He urges that in spite of the mighty efforts of the great powers for the upkeep of peace, peace cannot be established by atom bombs and war. Peace to be complete should be all-pervading and all-embracing and dynamic in character. It should be the property of all and not the personal property of any power or powers. To be at peace, the author writes, is to keep every body in peace. There seems in these days of scientific achievements no sense in maintaining a colour bar when thoughts of global peace fill the air. The only solution is to energise man and make him work for peace. Thus only the peace can come and stay. The latter half of the book is written in the form of a drama which reaffirms the same conclusion.

AIR TRANSPORT IN INDIA by S. K. Irtiza Naqui, M. Com., LL.B. Published by Kitab Mahal, 56-A, Zero Road, Allahabad. Pages 231, price Rs. 3/-.

Air transport now occupies an important lace in the scheme of transport and communica-ons. The development in this line in recent ars has been phenomenal. There are a large umber of different air services in operation rving various routes, both inland and foreign. good deal of interest hangs round the subject. e public are eager to know of the planning l sections of the airfields and aerodromes ..h arrangements for arrival and departure of the planes. As much interest lies in the functional operations of the different classes of personnel engaged in maintaining the planes on the ground and flying them in the air and also in the various apparatuses used in the plane. The book, though intended for B. Com. and M. Com. students with 'Transport in India' as a subject of their study, [illegible] information on the [illegible] transport for the public. [illegible] an account of the development [illegible] in India in recent years [illegible] and the advantages and [illegible] of air transport. A most interesting [illegible] is that relating to the lighting [illegible] for avoiding collisions in the air and [illegible] tions taken for their safe [illegible] and controlling them by wireless [illegible] accidents. There is also a [illegible] the international organisations relating [illegible] aerial transport. The book seems to be the [illegible] on the subject and will meet a real [illegible] the country.

NOTICES & REVIEWS

(Manufacturers sending [illegible] samples of their products for [illegible] may please note that no notice [illegible] medical preparations and allied [illegible] this section.)

BLUE-BLACK FOUNTAIN PEN INK

We are glad to receive a pot of "[illegible]" blue-black fountain pen ink from [illegible], 5, Tobin Road, Barnagore, Calcutta. [illegible] preparation is found to be in no way [illegible] the best brands selling in the market.

ELECTRIC HOLDERS

We have the pleasure to receive from [illegible] Products, 147, Manmotho Dutt Road, [illegible], Calcutta 37, samples of brass electrical holders of three different types, namely pendant type, bracket type and battom type. These have been manufactured under expert supervision. As regards quality and finish these are [illegible] superior to foreign ones.

FOREST RECORDS

We have received two copies of Indian Forest Records (new series), Vol. 1. Nos. [illegible] dealing with the formation of growth rings in Indian trees with diagrams and charts. [illegible] is published by the Forest Research Institute, Dehra Dun, U.P.

TRADE ENQUIRIES

(To communicate with any party [illegible] him direct with name and address [illegible] mentioning Industry).

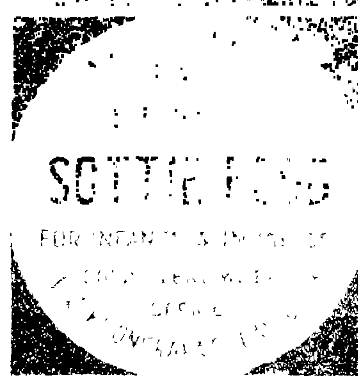
1405 Oomesh Mercantile [illegible], Pipe Road, Furguson Road Jn., [illegible] Bombay—Want to be put in touch [illegible] suppliers of mica scraps, topioca and [illegible] seeds.

1524 Shofant Khan, [illegible] Moradabad—Wants to be put in [illegible] dealers in crocodile leather and [illegible]

1529 The Indigenous [illegible] Produce (Sales) Co., 166, [illegible] Street, G. T., Madras—Want to be [illegible] with the suppliers of [illegible] India. Can supply Derris root [illegible]

1536 S. Naganna Chetty, [illegible] Street, Coimbatore—Wants to [illegible] with the [illegible]nufacturers of [illegible]


Introducing
HAIR DYE



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